

NOKIA CORP
Form 20-F
March 21, 2019
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As filed with the Securities and Exchange Commission on March 21, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 20-F

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE

SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2018

Commission file number 1 13202

Nokia Corporation

(Exact name of Registrant as specified in its charter)

Republic of Finland
(Jurisdiction of incorporation)

Karaportti 3 FI 02610 Espoo, Finland
(Address of principal executive offices)

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(Name, Telephone, E-mail and/or Facsimile number and Address of Company Contact Person)

Securities registered pursuant to Section 12(b) of the Securities Exchange Act of 1934 (the "Exchange Act"):

Title of each class	Name of each exchange on which registered
American Depositary Shares	New York Stock Exchange
Shares	New York Stock Exchange(1)

(1) Not for trading, but only in connection with the registration of American Depositary Shares representing these shares, pursuant to the requirements of the Securities and Exchange Commission.

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Securities registered pursuant to Section 12(g) of the Exchange Act: None

Securities for which there is a reporting obligation pursuant to Section 15(d) of the Exchange Act: None

Indicate the number of outstanding shares of each of the registrant's classes of capital or common stock as of the close of the period covered by the annual report. Shares: 5 635 945 159.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

If this report is an annual or transition report, indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Exchange Act. Yes No

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Exchange Act during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer", "smaller reporting company" or "emerging growth company" in Rule 12b 2 of the Exchange Act. (Check one):

Large accelerated filer	Accelerated filer
Non-accelerated filer	Smaller reporting company
Emerging growth company	

Indicate by check mark which basis of accounting the registrant has used to prepare the financial statements included in this filing:

U.S. GAAP

International Financial Reporting Standards as issued by the International Accounting Standards Board

Other

If "Other" has been checked in response to the previous question, indicate by check mark which financial statement item the registrant has elected to follow. 17 18 Item

If this is an annual report, indicate by check mark whether the registrant is a shell company (as defined in Rule 12b 2 of the Exchange Act). Yes No

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Forward-looking statements

Certain statements contained in this Annual Report constitute "forward-looking statements". Forward-looking statements provide Nokia's current expectations of future events based on certain assumptions and include any statement that does not directly relate to any current or historical fact. The words "believe", "expect", "expectations", "anticipate", "foresee", "see", "target", "estimate", "designed", "aim", "plan", "intend", "influence", "assumption", "focus", "should", "is to", "will", "strive", "may" or similar expressions as they relate to us or our management are intended to identify these forward-looking statements, as well as statements regarding:

A) business strategies including the four pillars of Lead, Expand, Build and Create, market expansion, growth management, and future industry trends and megatrends and our plans to address them, including Future X;

B) future performance of our businesses and any expected future distributions and dividends;

C) expectations and targets regarding financial performance, results, operating expenses, taxes, currency exchange rates, hedging, cost savings and competitiveness, as well as results of operations including targeted synergies and those related to market share, prices, net sales, income and margins;

D) expectations, plans, timelines or benefits related to changes in our organizational and operational structure;

E) market developments in our current and future markets and their seasonality and cyclicity, including for communication service providers, as well as general economic conditions and future regulatory developments;

F) our position in the market, including product portfolio and geographical reach, and our ability to use the same to develop the relevant business or market and maintain our order pipeline over time;

G) any future collaboration or business collaboration agreements or patent license agreements or arbitration awards, including income from any collaboration or partnership, agreement or award;

H) timing of the development and delivery of our products and services, including our short term and longer term expectations around the deployment of 5G and our ability to capitalize on such deployment as well as use our global installed base as the platform for success in 5G, and the overall readiness of the 5G ecosystem;

I) the outcome of pending and threatened litigation, arbitration, disputes, regulatory proceedings or investigations by authorities;

J) restructurings, investments, capital structure optimization efforts, divestments and our ability to achieve the financial and operational targets set in connection with any such restructurings, investments, and capital structure optimization efforts including our 2019-2020 cost savings program;

K) future capital expenditures, temporary incremental expenditures or other R&D expenditures to develop or rollout new products, including 5G; and

L) the sustainability and corporate responsibility contained in the sustainability and corporate responsibility section of this annual report on Form 20-F.

These statements are based on management's best assumptions and beliefs in light of the information currently available to it and are subject to a number of risks and uncertainties, many of which are beyond our control, which could cause actual results to differ materially from such statements. These statements are only predictions based upon

our current expectations and views of future events and developments and are subject to risks and uncertainties that are difficult to predict because they relate to events and depend on circumstances that will occur in the future. Risks and uncertainties that could affect these statements include by are not limited to the risk factors specified under “Operating and financial review and prospects Risk factors” of this annual report on Form-20 F and in our other filings or documents furnished with the U.S. Securities and Exchange Commission. Other unknown or unpredictable factors or underlying assumptions subsequently proven to be incorrect could cause actual results to differ materially from those in the forward-looking statements. We do not undertake any obligation to publicly update or revise forward-looking statements, whether as a result of new information, future events or otherwise, except to the extent legally required.

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Introduction and use of certain terms

Nokia Corporation is a public limited liability company incorporated under the laws of the Republic of Finland. In this annual report on Form 20 F, any reference to “we,” “us,” “the Group,” “the company” or “Nokia” means Nokia Corporation and its consolidated subsidiaries and generally to Nokia’s Continuing operations, except where we separately specify that the term means Nokia Corporation or a particular subsidiary or business segment only or our Discontinued operations. References to “our shares” matters relating to our shares or matters of corporate governance refer to the shares and corporate governance of Nokia Corporation.

Nokia Corporation has published its consolidated financial statements in euro for periods beginning on or after January 1, 1999. In this annual report on Form 20 F, references to “EUR,” “euro” or “€” are to the common currency of the European Economic and Monetary Union, references to “dollars,” “U.S. dollars,” “USD” or “\$” are to the currency of the United States, and references to “Chinese yuan” or “Chinese yuan renminbi” or “CNY” are to the official currency of the People’s Republic of China. Solely for the convenience of the reader, this annual report on Form 20-F contains conversions of selected euro amounts into U.S. dollars at specified rates or, if not so specified, at the year-end rate of 1.1450 U.S. dollars per euro, and conversions of selected euro amounts into Chinese yuan renminbi at specified rates or, if not specified, at the year-end rate 7.8751 Chinese yuan renminbi per euro. The referred year-end rates were the European Central Bank reference rates on December 31, 2018. No representation is made that the amounts have been, could have been or could be converted into U.S. dollars or Chinese yuan at the rates indicated or at any other rates.

Additional terms are defined in the "Glossary of terms".

The information contained in, or accessible through, the websites linked throughout this annual report on Form 20 F is not incorporated by reference into this document and should not be considered a part of this document.

Nokia Corporation furnishes Citibank, N.A., as Depositary, with its consolidated financial statements and a related audit opinion of our independent auditors annually. These financial statements are prepared on the basis of International Financial Reporting Standards as issued by the International Accounting Standards Board and in conformity with IFRS as adopted by the European Union (IFRS). In accordance with the rules and regulations of the SEC, we do not provide a reconciliation of net income and shareholders’ equity in our consolidated financial statements to the generally accepted accounting principles in the United States, or U.S. GAAP. We also furnish the Depositary with quarterly reports containing unaudited financial information prepared on the basis of IFRS, as well as all notices of shareholders’ meetings and other reports and communications that are made available generally to our shareholders. The Depositary makes these notices, reports and communications available for inspection by record holders of American Depositary Receipts (ADRs), evidencing American Depositary Shares (ADSs), and distributes to all record holders of ADRs notices of shareholders’ meetings received by the Depositary.

In addition to the materials delivered to holders of ADRs by the Depositary, holders can access our consolidated financial statements, and other information included in our annual reports and proxy materials, at nokia.com/financials. This annual report on Form 20 F is also available at nokia.com/financials as well as on Citibank’s website at <https://app.irdirect.net/company/49733/hotline/>. Holders may also request a hard copy of this annual report by calling the toll-free number 1 877 NOKIA-ADR (1 877 665 4223), or by directing a written request to Citibank, N.A., Shareholder Services, PO Box 43077, Providence, RI 02940 3081, United States. With each annual distribution of our proxy materials, we offer our record holders of ADRs the option of receiving all of these documents electronically in the future.

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We create the technology

to connect the world

We are at the dawn of a new era. Digital technologies – cloud computing, artificial intelligence, machine learning, the Internet of Things and 5G networks – are changing our world. Nokia is driving innovation and the future of technology to power this digital age and transform how people live, work and communicate.

We push the boundaries of what is possible to create new ways of connecting people, things and services instantly and effortlessly. We build upon a foundation of integrity, quality and security. We help our customers navigate complex choices, drive productivity gains in physical and digital industries alike, and unlock new opportunities that provide extraordinary experiences in people's lives each day.

Financial Highlights

For the year ended December 31,	2018	2017	2016
Continuing operations	EURm	EURm	EURm
Net sales	22 563	23 147	23 641
Gross profit	8 446	9 139	8 524
Gross margin	37.4%	39.5%	36.1%
Operating (loss)/profit	(59)	16	(1 100)
Operating margin	(0.3)%	0.1%	(4.7)%
Loss for the year	(549)	(1 437)	(912)
	EUR	EUR	EUR
Earnings per share, diluted	(0.10)	(0.26)	(0.13)
Dividend per share	0.20	0.19	0.17
	2018	2017	2016
As of December 31	EURm	EURm	EURm
Net cash and current financial investments	3 493	3 051	4 514

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Letter from our President and CEO

“2018 saw the commercial deployment of 5G move forward in lead countries, and Nokia was at the forefront of this activity. In 2019 we expect to see more organizations around the world take their first steps in creating the infrastructure for the Fourth Industrial Revolution – and Nokia is ready to be their trusted partner.”

Financial Highlights

Although our performance in 2018 was below our expectations overall, we exited 2018 with a strong finish, confirming our expectation of accelerated sales momentum as the year progressed. Indeed, we had a strong second half with every one of our Networks Business Groups delivering year-on-year growth, excluding the impact of changes in foreign currency exchange rates. This drove growth in Nokia’s net sales for the year of 1%, excluding the impact of changes in foreign currency exchange rates.

Our Networks business delivered approximately 2% growth in 2018, excluding the impact of changes in foreign currency exchange rates, fueled by the continued success of our end-to-end strategy and the conversion of a healthy pipeline into net sales. This allowed us to take share in certain segments of the market, while the overall market itself declined slightly. High customer engagement in multiple elements of our 5G portfolio sees us enter 2019 with a strong Networks order backlog. In Nokia Technologies, we maintained our strong growth track record with 11% year-on-year growth in recurring licensing revenue.

Reflecting this momentum in the year, the Board of Directors will propose a maximum dividend of EUR 0.20 per share for 2018: a 5% increase compared to 2017.

Progress in our strategy

In our first pillar – leading in high-performance, end-to-end networks with Communications Service Providers – we have proven our capabilities as the commercialization of 5G begins. We proudly serve as a partner to most of 5G’s ‘first-movers’ with over 25 5G commercial deals and nearly 100 trials and pilots of the new technologies.

In our second pillar – expanding network sales to select vertical markets – we support a wide and growing range of organizations as they evaluate how best to digitalize their operations. Enterprises are increasingly looking at dedicated networks to enable them to have full control over networking solutions that have the characteristics they need for their business. Today we serve approximately 1 000 customers outside of our traditional Communications Service Provider base, bringing connectivity to some of the most complex, fast-moving industries on earth, including a number of new automotive, energy and transportation customers that placed their trust in our technologies in 2018.

In our third pillar – building a strong standalone software business at scale – we see clear signs of our strategy bearing fruit. Nokia Software is now a truly verticalized business, driven by a renewed sales organization, underpinned by simpler processes and boasting a modern, cloud-native common software foundation. The attractiveness of this proposition is borne out through strong 2018 sales momentum including wins with AT&T, BT, STC, Sky, Telenor One Europe and Verizon and the industry analyst research firm, Analysys Mason, ranked us the leading telecoms software company by revenue.

In our fourth pillar – creating new licensing opportunities – our successes in 2018 with existing and new licensee customers have validated our direction for Nokia Technologies. This year we have extended our patent licensing agreement with Samsung; signed a new multi-year patent license agreement with Chinese smartphone maker OPPO;

and benefited from continued progress made by our brand licensee, HMD Global, which unveiled a range of new products throughout 2018 with production capacity to deliver on demand. We see further potential in licensing to smartphone makers and in other markets which are using our patented inventions, such as automotive, consumer electronics and IoT devices such as smart meters.

Accelerating our strategy

Given the considerable momentum of our strategy, and with the successful Alcatel Lucent integration and associated cost-saving program completed, we took steps during 2018 to accelerate the execution of our strategy and position our business for 5G leadership. Alongside a new program targeting EUR 700m in annual cost savings(1) by the end of 2020, these steps have led to a number of organizational changes that further strengthen our ability to deliver on our 2019 and 2020 guidance.

First, we have created a new Business Group, Nokia Enterprise, that consolidates a range of existing, fast-growing activities into one organization. Led by Kathrin Buvac, Nokia Enterprise will enhance our ability to capture higher-growth, higher-margin opportunities as companies progress with their digital transformations.

Second, we have tailored Mobile Networks' operational focus on mobile radio products, led by Tommi Uitto, and consolidated all our Cloud Core activities and accountability into Nokia Software, under the leadership of Bhaskar Gorti.

We have also realigned Nokia's customer-facing organization into two regional groups, to make sure our customer focus is as strong as possible. The first group covers the Americas, led by Ricky Corker. The second is responsible for Europe, Middle East & Africa and Asia-Pacific, led by

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Federico Guillén who previously led Fixed Networks. The new President of Fixed Networks, Sandra Motley, is charged with continuing the operational discipline of the Business Group while capturing new market opportunities for its portfolio.

These changes have strengthened our organization, sharpened our focus, and added strong capabilities to Nokia's Group Leadership Team.

The 5G investment cycle

From the first trials to the first roll-outs, 2018 was the year in which 5G became a commercial reality. It is my firm belief that we now stand at the start of a meaningful, long-term technology trend that bodes uniquely well for Nokia.

5G will power networks that connect sensors, machines, platforms, systems and people in one seamless, automated 'whole'. This fundamental shift in network design will require several different stages of investment, each of which leads naturally to the next. Nokia's unique, end-to-end portfolio includes products and services for each stage of this process, leading to a virtuous cycle of investment that only Nokia can truly take advantage of.

The cycle has already begun with 5G radio access network (RAN) upgrades in 'first-mover' markets such as the US, Korea, China and Japan, which our Airscale portfolio enables. As well as radio, these networks also need high-capacity connectivity to data centers, requiring backhaul network expansion. Demand in the U.S. for our IP and Optical Anyhaul offer shows this trend already taking shape.

With networks built, operators will then need fixed-wireless access to expand "last-mile" connectivity. With the most complete fixed-wireless access product set of any provider, we are well-placed to tap this opportunity.

In due course, 'fast-follower' countries will commence their 5G roll-outs. Yet, by this point, 'first-mover' countries will already have entered the second stage of 5G evolution. Here, the focus will shift to network virtualization and edge cloud and smart network fabrics will be required to connect these edge clouds, all playing to Nokia's strength in cloud deployment and packet core.

Network slicing will follow, triggering a need for enhanced software that can control networks with high degrees of automation: our standalone software business and early moves in AI will allow us to capitalize.

Simultaneously, many enterprises will choose to build their own private networks, meeting bespoke performance, reliability and security requirements. These networks will leverage the same end-to-end technologies as CSPs, but on a smaller scale. These will need to be plugged into national or global networks, creating a seamless 'whole', driving even greater network traffic and shifting the cycle back to the beginning.

No other global company touches every link in this cycle. No matter how early or late stage the investment, be it a 'first-mover' or 'fast-follower' geography, a Communications Service Provider innovator or a digitally-minded enterprise, Nokia's end-to-end portfolio means that we can meet every 5G investment requirement that lies ahead.

Force for good

Digital technology increases productivity, reduces waste and connects the world, so it was pleasing that the radio networks we delivered to our customers served around 6.1 billion subscriptions worldwide this year, up about 10% from 2016. As the 5G era begins we will see even greater societal and industrial benefits.

Climate challenges remain critically important. We have worked hard to minimize the energy use of our products. Achievements included the first commercial liquid-cooled base station in the world, recognition as a leader by the CDP Climate rating, and achieving average energy savings of 43% for customers whose networks we modernized during 2018. These and many more examples of our sustainable development work can be found in our People & Planet Report, to be published in May 2019.

Looking ahead

Nokia exits 2018 with strength, energy and purpose. The year has not been without challenges, but nevertheless, we have remained focused on our commitments to our customers, people and shareholders. Our strategy is focused on the true areas of opportunity; our global team is committed, dynamic and capable of innovating and winning at the highest level; and our end-to-end portfolio has put us in a great position to grasp the transformative 5G opportunity ahead.

Rajeev Suri

President and CEO

(1) Excluding costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

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Market trends driving our strategy

We are rebalancing for growth, putting Nokia at the heart of unprecedented opportunities in the Fourth Industrial Revolution to create the technology to connect the world.

In 2016 we identified six global megatrends that we believe continue to impact our current and potential customers, change the lives of people and impact business operations on a global scale. The Nokia Bell Labs Future X vision is directly aligned to these megatrends, providing opportunities for us to diversify into new growth areas.

The megatrends we have identified are:

- (1) Network, compute and storage: Ever present broadband capacity coupled with a distributed cloud for ubiquitous compute and near infinite storage, allowing limitless connectivity and imperceptible latency as well as subscription-based and asset-less business models.
- (2) Internet of Things: In addition to people, trillions of things are connected to the internet and amongst themselves, collecting unprecedented amounts of data in a private and business context.
- (3) Augmented Intelligence: Artificial intelligence combined with human intelligence transforms the collected data into actionable insights, fundamentally changing the way decisions are made by businesses, governments and individuals, resulting in time savings, less waste, higher efficiency and new business models.
- (4) Human and machine interaction: A range of new form factors that transform the way humans interact with each other and with machines, e.g. voice-based digital assistance, gesture control, smart clothes, implantable chips, robotics and Augmented and Virtual Reality.
- (5) Social and trust economics: Ubiquitous connectivity, compute and storage, as well as technologies such as artificial intelligence and blockchain, enabling new business models based on sharing assets and distributed trust, allowing rapid scalability on a global level.
- (6) Digitization and ecosystems: Next level of digitization beyond content and information, digitizing atoms with additive printing in an industrial, consumer and medical context, digitizing logistics and production processes, transforming global supply chains by massive-scale automation.

Nokia Bell Labs has developed Future X, our vision of a future network architecture that addresses these megatrends in a holistic way. This is our guide to building networks that meet the future needs of our customers and address the inherent opportunities in the megatrends. The Future X vision encompasses the key domains of future networks: emerging devices and sensors, massive-scale access, converged edge cloud, smart network fabric, universal adaptive core, programmable network operating systems, augmented cognition systems, digital value platforms and dynamic data security.

Simultaneously, driven by the megatrends and the resulting increasing relevance of networks to digitize business operations, we see a shift in who is investing in technology.

Our primary market with communication service providers (CSPs), in which we have a leadership position, is very large in size, but expected to provide a limited estimated growth opportunity, mainly driven by 5G.

However, the megatrends are increasing the demand for large high-performance networks in other key industries. Webscale companies – such as Google, Microsoft and Alibaba – are investing in cloud technology and network infrastructure at an increasing scale. As other vertical markets such as transportation, energy and the public sector (TEPS) digitize their operations, they need high-performing mission-critical networks as well. The same is true for TXLEs – technically sophisticated large enterprises, such as banks, that invest heavily in their own network infrastructures to gain a key competitive advantage. Our “Future X for industries” network architecture combines the

technologies that drive dramatic productivity improvements across a wide range of industry sectors. As technologies such as edge cloud supporting augmented intelligence and advanced security analytics as well as end-to-end 5G-capable networks become a reality, they will radically speed up the digital transformation of industries such as manufacturing, logistics, transportation and energy, as well as governments and cities. Nokia's holistic approach is helping to drive a new era of productivity and human-machine interaction that is expected to unlock trillions of dollars of economic value in the next decade.

We are addressing both our primary CSP market and the newly identified growth opportunities in the Industrial IoT with our "Rebalancing for Growth" strategy. The strategy builds on our core strength of delivering large high-performance networks by expanding our business into targeted, higher-growth and higher-margin vertical markets.

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Our strategy

Our four pillars

Our strategy builds on our business portfolio and continued drive to create technology that serves people and businesses and includes the following four key priorities.

1. Lead

Lead in high-performance, end-to-end networks with CSPs

Our position

Nokia is a leader in this area today and we will use our main competitive advantage – a near-100% end-to-end portfolio that we can deliver on a global scale – to maintain our leadership while managing for profitability.

Our focus areas

- § We are differentiating ourselves with our end-to-end networks that deliver benefits for our customers in automation, total cost of ownership and time to market.
- § We are establishing leadership in 5G through our presence with 5G leading customers in the first 5G markets globally and achieving global technology and quality excellence.
- § We are innovating in augmented intelligence, analytics and automation for fast and flawless delivery of our network infrastructure services.
- § We are providing industry-leading cognitive network services to improve network performance, operational efficiency and subscriber experience, and developing service business models to open new revenue streams for CSPs.
- § We are maintaining our leading market share in copper and fiber access, accelerating momentum in fixed wireless access, successfully expanding in the cable market, further developing new smart home solutions such as whole-home Wi-Fi, and simplifying network operations for our customers.
- § We are leveraging our superior products and the next-generation IP routing portfolio based on our FP4 chipset to grow in both edge and core routing, where we have a fully virtualized portfolio that is differentiated by performance, flexibility, security and quality.

Progress

- § We are driving the deployment of 5G: the number of customers already engaged with us on 5G is rapidly heading over the 100 mark, and amongst those we have already signed over 25 5G supply agreements. Our global base of mobile broadband customers puts us in a position of strength as 5G rollouts accelerate globally.
- § In July, 2018, we announced a landmark USD 3.5 billion agreement with T-Mobile to accelerate the deployment of their nationwide 5G network in the United States. During the year we also signed three separate framework agreements with a combined value of EUR 2 billion with China Mobile, China Telecom and China Unicom.
- § Independent third party assessments by P3/Connect and others testify to Nokia's superior networks performance around the world.

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2. Expand

Expand network sales to select vertical markets

Our position

We continue to expand into select vertical markets that have high-performance, carrier-grade networking needs: Web and cloud companies; transportation, energy, public sector (TEPS); and TXLE (large enterprises for which technology is a strategic advantage). As the world becomes more digital and more automated, the kind of high-performance, low-latency networks once used almost exclusively in telecommunications are now needed by other organizations. This is especially true in organizations that own high-value, movable assets that are mission-critical. To address this growing need for high-performance networks, Nokia formed the Nokia Enterprise business group. With Nokia Enterprise, we have implemented a combined sales organization, a targeted portfolio and new solutions that address our customers' digitization and automation needs.

Our focus areas

- § Web and cloud customers increasingly require high-performance networks to improve customer experiences and to expand their primary business models. For web and cloud companies, we are focusing on an all-IP-led approach, providing IP routing and optical network infrastructure.
- § Large, tech-savvy enterprise (TXLE) customers need to virtualize and automate their hybrid cloud data centers with technology disruptions like software-defined wide area networking (SD-WAN), software-defined security, and branch office connectivity. Nokia can address those needs with SD-WAN and our all-IP portfolio.
- § TEPS customers require high-performance, mission-critical networking that digitizes their energy systems, rail systems and cities. They also need to layer on top of those networks industrial automation platforms that help digitize their operations. Nokia offers mission-critical networks, solutions for digitization and Industrial IoT, and industrial automation.
- § Other verticals also need to increase productivity and reduce costs through the digitization and automation of their operational systems. This can be accomplished with Industrial IoT platforms, automation platforms and private wireless networks. Nokia now targets these opportunities.

Progress

- § In 2018 we made good progress in our select vertical markets with over 150 new customers and we now have more than 1 000 enterprise customers. We consolidated our enterprise-specific activities into Nokia Enterprise, our new business group, which commenced operations January 1, 2019.
- § In 2018 we delivered constant currency sales growth of 9% in the enterprise space, excluding the third-party business that we are exiting, and posted solid profitability.
- § We unveiled our "Future X for industries" strategy and architecture, which leverages digital transformation technologies to catalyze productivity and economic growth for enterprises.
- § We also announced numerous private LTE deals during the year including Elektro, a power distributor in Brazil, and BMW's smart manufacturing facility in partnership with China Unicom.

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3.Build

Build a strong software business

Our position

With our existing software products, we are today a leader in the large and growing telecoms software market. Our ambition is to build on this foundation and strengthen our position by building software for Digital Time. This means intelligently connecting humans, machines and data to boost productivity and thus create time for what matters the most. We help our customers to connect data across their business, network and operations and help them create insights for maximizing their investments – in time, relationships, revenue and productivity. By doing so, we aim to create a global software player that has a growth and margin profile like leading software companies. The basis for all our activities is diligent cost management, lean operations and a focus on developing and engaging our people.

Our focus areas

- § We are accelerating our innovation to meet customer expectations faster. For this purpose, we are adopting the Common Software Foundation across all our products and making them cloud-native, as well as reorganizing our R&D for greater effectiveness. We are also gearing Services and Care to next-generation effectiveness for faster delivery and flawless customer service.
- § We are modernizing our portfolio via Connected Intelligence by incorporating artificial intelligence and machine learning everywhere, enabling new revenue streams, pushing the limits of automation in operations, and moving to secure cloud-native networks. Beyond individual products, we integrate and deliver results-oriented solutions across our portfolio and with strategic partners.
- § We are optimizing our go-to-market strategy with a refreshed software sales team, better pricing models and stronger partnerships.

Progress

- § Throughout the year our Nokia Software business group continued to demonstrate the strength of its portfolio by winning major accounts including BT, Telenor One Europe, STC, Telefónica UK and Sky.
- § Analysys Mason ranked Nokia #1 in telecom product software revenues and #2 in combined telecom product and product-related revenues in its latest annual report released in November, 2018.

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4.Create

Create new licensing opportunities

Our position

Our approach is to keep our patent licensing business strong, creating new revenue streams from patent and technology licensing and brand partnerships. We own one of the broadest and strongest patent portfolios in our industry, built from the innovation of Nokia, Nokia Siemens Networks and Alcatel Lucent. At the end of 2018 our patent portfolio included around 20 000 patent families, and we filed patents on more than 1 300 new inventions during 2018.

Our focus areas

- § We continue to renew the portfolio through innovation in multiple areas, especially cellular standard essential patents, in part as a result of the extensive research activities of Nokia Bell Labs.
- § In addition to renewing existing patent licenses on favorable terms, our aim is to add new licensees from the mobile industry, and we continue to expand patent licensing into new segments, such as automotive, IoT and consumer electronics. Besides this, we are exploring opportunities to license our unique audio/visual technologies to device creators.
- § Our brand licensing efforts are well underway – we see value creation opportunities in the mobile devices industry, leveraging our strong Nokia brand. Our exclusive brand licensee for mobile phones and tablets, HMD Global, has already launched a comprehensive portfolio of new Nokia-branded feature phones and smartphones.

Progress

- § Further validating our global licensing program, Nokia and the Chinese smartphone company OPPO signed a multi-year patent license agreement. In addition, we extended our patent licensing agreement with Samsung.
- § Nokia's brand licensee HMD Global continued to refresh its smartphone portfolio with numerous new models and announced plans to double its manufacturing capacity in India to satisfy demand.

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Networks business

Market overview

Through our comprehensive end-to-end portfolio of products and services we are addressing a market that encompasses mobile and fixed network access infrastructure, IP routing and optical networks, mobile and converged core networks, as well as software platforms and applications.

Our personal lives and enterprises are becoming increasingly more digitized, driving exponential growth in data traffic and, in turn, driving the demand for our portfolio of highly reliable and high-performance networks to support massive connectivity.

Our Annual Report on Form 20-F for 2019 will reflect our new segment reporting structure, which separates the Networks and Software businesses. For more information, see Note 37, Subsequent events, in the Financial Statements section.

Competition

The main competitors in our primary market are Huawei, Ericsson and ZTE, and in some markets we also encounter Samsung. We also compete with technology experts in some of our other market segments, such as Juniper Networks and Cisco in the IP networking and security segments, and Ciena, Adtran and Calix in the optical networks and fixed access segments. Both the optical networks and Nokia Software market segments, as well as the microwave transport market segment remain highly fragmented.

Sales and marketing

Nokia considers its customers in two distinct markets. Our primary addressable market consists of CSPs. Our current enterprise business is small in comparison with our operator business but growing fast.

The geographically divided Customer Operations (CO) organizations are the primary interface with our CSP customers. The CO Americas organization focuses on our markets in North America and Latin America, while the CO EMEA & APAC organization is responsible for our Asia Pacific & Japan, Europe, Greater China, India, and Middle East and Africa markets.

The CO organizations have a comprehensive global presence (active in approximately 130 countries) and its structure ensures that our customers benefit from dedicated management attention and from our teams' deep understanding of local markets. This approach enables Nokia to maintain strong customer relationships.

The priority of the CO organizations is to serve our customers. And, since 2018, the CO organizations have been responsible for both delivery and sales, ensuring strong alignment between our customer-facing teams in each account. Our "One CDM" (customer delivery manager) model provides a strong counterpart to our customer team setup, ensuring that customers have a seamless experience when working with Nokia. This is particularly important given the value our customers put on Nokia's end-to-end approach, which can provide a solution to a customer need based on portfolio elements from several of our business groups.

The CO organization also works very closely with our sales and delivery colleagues in Nokia Software to ensure the right level of customer focus and expertise in this crucial area, and with our colleagues in Nokia Enterprise to make sure that we are efficient in developing and selling the solutions that will benefit both our CSP and enterprise customers. We strongly support our "Service-Provider-as-a-Partner" (SPaaP) sales approach, in which we work in

partnership with operators to address customers in the enterprise space. This model is proving to be a successful route to market for CSPs as well as for Nokia.

Research & development

We are one of the industry's largest R&D investors in information communication technology and we drive innovation across telecommunications and vertical industries to meet the needs of a digitally connected world. Product development is continually underway to meet the high programmability, agility and efficiency requirements of the next-generation software-defined networks that will accommodate mobile and fixed broadband, IoT, intelligent analytics and automation, which are used to forge new human possibilities.

We have a global network of R&D centers, each with individual technology and competence specialties. The main R&D centers are located in Belgium, Canada, China, Finland, France, Germany, Greece, Hungary, India, Italy, Japan, Poland, the Philippines, Portugal, Romania, the United Kingdom and the United States. We believe that the geographical diversity of our R&D network is an important competitive advantage for us. In addition, the ecosystem around each R&D center helps us to connect with experts on a global scale, and our R&D network is further complemented by cooperation with universities and other research facilities.

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Mobile Networks

Market overview

The primary market for our Mobile Networks business group includes technologies for mobile access and microwave transport. This encompasses access network technologies ranging from 2G to 5G licensed and unlicensed spectrum for both macro and small cell deployments.

Business overview and organization

We see a strong initial appetite for 5G in the most progressive and advanced mobile markets, and we are the only end-to-end mobile network vendor working with the major operators in the U.S., China, South Korea and Japan. Nokia is rolling out technology today to prepare our customers for commercial launches when 5G devices and spectrum become available.

In Mobile Networks our goal is to be the leader in 5G and provide the best value to our customers as they evolve their networks. In December 2017 the first 3GPP specifications were confirmed – including 5G New Radio (NR) – and since then, the technology and the market have moved fast. We continue to develop our 5G portfolio according to the latest 3GPP specifications and are proud of the number of industry firsts that we have completed on the path to 5G commercialization. Furthermore, we continue to invest significantly in our ReefShark processor family for baseband and RF. Our customers are moving fast as well: our first commercial 5G radio contract was signed in January 2018 with NTT DoCoMo in Japan based on 5G New Radio. As an industry, we have moved quickly from specifications to development, testing, and implementation in real networks. To this end, roughly half of our R&D personnel are fully focused on 5G and this is expected to increase as we continue to move personnel on a periodic and strategic basis. As we move from 4G to 5G, we aim to become a champion of continuous integration, continuous delivery and DevOps.

We have a global installed base that is expected to provide us with the platform for success in 5G. We have more than 400 customers in 4G/LTE and a robust AirScale platform, which can be upgraded from 4G to 5G. We built our AirScale portfolio and small cells, software and mobile transport solutions to work across all generations of technology and all relevant spectrum bands for efficient, simplified and optimized sites for our customers. In radio we build our access portfolio based on one architecture: Future X is the foundation of our reference architecture for all deployment models. The Nokia 5G Future X end-to-end product and services portfolio combines high-capacity 5G New Radio, core, SDN-controlled “Anyhaul” transport, edge clouds, and software orchestration to provide a complete set of network capabilities for commercial 5G.

Competition

The mobile networks market is a highly consolidated market as a whole, and our main competitors are Huawei and Ericsson. Additionally, there are two regional vendors, ZTE and Samsung, that have an estimated market share of below 10%. The microwave transport market segment, however, remains fragmented.

In January 2018, Nokia announced its end-to-end 5G Future X network architecture and ReefShark chipset. The ReefShark chipset decreases the size of massive MIMO antennas by 50%, increasing deployment options, and achieves a 64% reduction in power consumption of baseband units. We also launched the world’s first MulteFire small cell, enabling industries, enterprises, smart cities and mobile service providers to leverage global unlicensed spectrum for secure, high-capacity private LTE networks.

In July 2018 Nokia and T-Mobile announced a \$3.5 billion, multi-year 5G network agreement. Under the agreement, Nokia will provide T-Mobile with its complete end-to-end 5G technology, software and services portfolio.

Firsts: First Over the Air (OTA) NSA video streaming call with the Airphone at the end of April, first full L1 release for ABIL (based on 3GPP shadow specification V4) created in early May, live 5G installations in Oulu for 3.5 GHz and 28 GHz, and industry firsts, like the Edge Cloud data center solution for the 5G era. We were the first in the US to demonstrate a 5G NR connection over massive MIMO with Sprint. We achieved the first 5G NR mobility call with Verizon and reached peak data speeds of 1.45 gigabits per second (Gbps) on LTE in a live commercial environment using six channel carrier aggregation with Verizon and Qualcomm. Meanwhile we helped San Marino become the first 5G state in Europe with Telecom Italia and, in China, we achieved the world's first 3GPP-compliant 5G NR test of the same kind completed with a 3rd party device with China Mobile.

2018 highlights

In January, Nokia unveiled its new ReefShark chipsets which leverage in-house silicon expertise to dramatically reduce the size, cost and power consumption of operators' networks and meet the massive compute and radio requirements of 5G.

In July, Nokia and T-Mobile announced a USD 3.5 billion, multi-year 5G network agreement. Under the agreement, Nokia will provide T-Mobile with its complete end-to-end 5G technology, software and services portfolio.

In August, Verizon and Nokia completed first 5G NR mobility call.

In September, AT&T selected Nokia as a supplier to seamlessly accelerate the transformation of their network to 5G.

In November, Nokia signed frame agreements worth more than EUR 2 billion with three Chinese operators. Agreements will increase network speed and capacity as well as improve reliability across China, while introducing new network capabilities as operators evolve toward 5G.

In December, Nokia and Telenor Group announced plans to deploy AirGile cloud-native core solution to transform mobile network operations in Scandinavia. Deployment in Denmark, Norway and Sweden will enable new capabilities in service agility, scalability, automation and network slicing as Telenor evolves toward 5G.

In December, Helsinki Airport became the first 5G airport in the world with Nokia network technology.

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Fixed Networks

Market overview

The primary market of Fixed Networks is the CSPs. In this market, the shift from copper to fiber has been accelerating in all regions and we see a strong rise of next-generation copper and fiber technologies, such as G.fast and XGS-PON (10 gigabit passive optical networks). Virtualization of fixed access networks is slowly but surely picking up. Complementary technologies such as fixed wireless access and whole-home Wi-Fi are clearly gaining traction. We have been diversifying our business into new segments, including cable MSOs, energy, government, enterprise and non-traditional players with new business models, such as investment firms.

Business overview and organization

We are diversifying our portfolio with constant innovation and have the industry's most complete portfolio to make our customers' business case work. In 2018 the results of our 2017 R&D investments started paying off. We had breakthroughs with the first European and Asian customers for Unified Cable Access, and the first contracts for Nokia Wi-Fi, Wireless PON and 5G to-the-home. We also signed five new virtualization customers for our software-defined access solution. We are also diversifying geographically, with breakthroughs with service providers in new and important growth markets such as Japan, South Korea and India.

The Fixed Networks strategy is based on a concept we call the "power of and": fixed and mobile; gigabit to and into the home; the network and the cloud.

The first pillar of this strategy, fixed and mobile, is about offering the right technology mix to deliver gigabit access to more people, faster. It comprises copper, fiber, coax and fixed wireless access technologies. Nokia is a market leader in copper technologies, such as VDSL2 vectoring, Vplus and G.fast. We also increased our market share in fiber, with technologies such as GPON, ethernet point-to-point and 10 gigabit next-generation fiber technologies (with XGS-PON getting significant market traction). We have been enlarging our portfolio with new ASICs for our leading G.fast and VDSL2 solutions, new options for our copper platforms called Long Reach VDSL2 (VDSL2-LR) and new fixed wireless access products, including FastMile high-gain outdoor receivers and indoor gateways.

For cable operators, Nokia offers the true end-to-end technology capabilities needed to support growing capacity requirements today and into the future. Nokia's Unified Cable Access solution has put an end to the industry debate on R-PHY versus R-MACPHY and offers a full toolbox of fiber, coax and virtualized distributed access architecture solutions. The Unified Access Solution is now being deployed with the first European customer, after a successful debut in the US last year. Nokia has also brought to life the technology, Full Duplex Docsis, to support 10Gbps symmetrical services over coax cable networks.

The second pillar, delivering a gigabit to and into the home, is about ensuring the perfect connectivity throughout the home. Fixed Networks has been expanding its business, evolving into the whole-home Wi-Fi market with the Nokia Wi-Fi portfolio. Nokia Wi-Fi provides perfect coverage in every corner of the home, supporting CSPs in their goals to offer managed Wi-Fi services and deliver a superior customer experience. Third-party tests show superior performance of the Nokia Wi-Fi beacons. The first customers are signed up and have started offering the service to their subscribers.

As networks become ever more complex, given the diversity of technologies and deployment options, the third pillar of our strategy looks at simplifying and automating operations. Virtualization plays a key role in this. Moving functions to the cloud makes networks easier to manage and scale. With our software-defined access network solution, Nokia takes a pragmatic approach. Our strength and competitive advantage lie in the fact that our virtualization

solution offers a smooth migration path for service providers to gradually evolve their legacy equipment to a software-defined network combined with the coexistence with legacy systems that CSPs may decide not to evolve. We launched our fully open and programmable fixed access network slicing solution, and our Multivendor ONU Connect, the industry's only fully open, virtualized solution that resolves PON CPEs multivendor interoperability (one of the biggest pain points for fiber operators) and signed up five new customers.

Enabled by Nokia's advanced automation and analytics, Nokia launched the Fixed Access Health Index for service providers, a new metric for measuring and benchmarking the quality and performance of fixed access networks.

Competition

The competitive landscape in fixed access for CSPs has two major key players, Nokia and Huawei, who have the bulk of market share. ZTE, in third position, has been impacted by the U.S. components ban. Smaller players like Calix and Adtran in North America and Fiberhome in China have limited footprint and have a market share smaller than 10% and no comparable breadth of portfolio.

Nokia continued to be the market leader in copper access and one of the market leaders in fiber access, growing its market share. Nokia is the only vendor with a leading market share in all regions worldwide, and the only Western supplier in China.

Fixed Network's strategy of Growth through diversification is paying off. Diversification in portfolio is opening growth opportunities in cable, whole home Wi-Fi, fixed-wireless access and virtualization. Geographical diversification has delivered breakthroughs in countries like South Korea, India and Japan, with good growth opportunity. Market diversification is opening new business opportunities in new segments and with non-traditional customers.

Nokia remains a clear, front-of-the-pack leader in the race to deliver state-of-the-art fixed networking solutions.

2018 highlights

Nokia continued to be the market leader in copper access and one of the market leaders in fiber access, growing its market share. We are the only vendor with a leading market share in all regions worldwide, and the only Western supplier in China.

For Fixed Networks, our strategy of growth through diversification is paying off. Our portfolio diversification is opening growth opportunities in cable, whole-home Wi-Fi, fixed wireless access and virtualization; our geographical diversification has delivered breakthroughs in countries like South Korea, India and Japan, with good growth opportunity; and our market diversification is opening new business opportunities in new segments and with non-traditional customers.

We believe that Nokia remains a clear, front-of-the-pack leader in the race to deliver state-of-the-art fixed networking solutions.

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Global Services

Market overview

The Global Services business group's market includes network infrastructure and professional services for mobile networks, in addition to managed services for the fixed, mobile, applications, IP and optical domains.

Business overview and organization

The services, solutions and multi-vendor capabilities of our Global Services business group help CSPs and enterprises in the transport, energy and public sectors (TEPS) navigate through the evolving technology landscape, network complexity and data growth. We work with them to improve end user experience while providing support in day-to-day network planning, implementation, operations and maintenance.

Our Global Services offering allows Nokia to differentiate in the 5G market while helping operators prioritize their 5G investments and bring 5G-based services to the market faster. Nokia 5G Acceleration Services portfolio helps CSPs prepare for 5G business cases and assess the technical choices, plan and design the end-to-end deployment and manage the complexity of multi-vendor and legacy networks.

Our other key focus area in Global Services is empowering CSPs to transform to digital service providers. We are building a new digital architecture for the full life cycle of network design, deployment, operations and technical support – both for legacy and cloud-based networks. We tap into advanced analytics, powered by Nokia AVA, our cognitive service delivery platform, to help boost network performance, operational efficiency and customer experience. Software robots speed up network upgrades – for example, 11 000 eNodeBs were upgraded in one night with 100% accuracy for a large tier 1 operator. We also help digital service providers to seize the possibilities of IoT and enter new markets using Nokia Worldwide IoT Network Grid (WING), which provides seamless connectivity across geographical borders and technologies. We enable our customers to enter new markets rapidly and with low risk through pay-as-you-grow or revenue share models where, for example, WING and Nokia AVA's Analytics Services are provided as-a-Service (aaS).

We have invested heavily in automation, data science and artificial intelligence. Our digital field force is empowered by augmented reality and video support from our Global Delivery Centers. In 2018 we completed the first successful deployments on our crowdsourcing platform. Our engineers process 6 million trouble tickets each year using artificial intelligence and help ensure the best experience for more than 1 billion subscribers worldwide.

Global Services introduced a new organizational structure effective in August 2018 to accelerate its strategy execution, drive efficiencies in the established base businesses, such as network deployment and technical support, and capture new business opportunities, for example in analytics and Industrial IoT.

Competition

In a market segment that combines products and services as well as managed services, Nokia competes against Huawei, Ericsson, ZTE and Cisco, while for the service-led businesses like cognitive network analytics services and IoT and systems integration, we see other competitors such as Netcracker, HPE and IBM emerging in addition to Ericsson and Huawei.

The launch of Security Risk Index and Managed Security Service ensure communications service providers can protect their networks against all threats. In addition to addressing their own security needs, communications service providers can white label Managed Security Services to enterprises under their own brand, which offers revenue

potential in the fast-growing enterprise security market.

Nokia Cloud Collaboration Hubs were opened in Singapore, Irving, Texas, and Reading, UK. The hubs are execution centers where multivendor cloud services from strategy and design to execution and delivery are provided.

Nokia expanded its offering for smart cities and public safety by launching Advanced Command Center, which enables better decision making by strengthening situational awareness, and improves emergency response by utilizing video communications, IoT, analytics and automation. In addition, IoT for Smart Cities, Sensing as a Service, and S-MVNO for Public Safety expand Nokia's offering for verticals.

Analytics services gained traction with customers including Telenor Pakistan, Ooredoo Myanmar, EE UK, StarHub, 3 Indonesia, and Nokia AVA was rated the leading Telco AI Ecosystem by Analysys Mason.

Nokia WING, a managed service for global IoT deployments, was selected by AT&T, Tele2 and Marubeni Corporation to provide seamless connectivity across geographical borders and technologies.

To help operators rollout 5G technology, Nokia introduced Cross-domain Architecture and Site Evolution Services and launched Nokia 5G Digital Design, a unique, patent-pending concept, that will dramatically revolutionize the way networks are designed.

2018 highlights

Analytics services gained traction with customers including Telenor Pakistan, Ooredoo Myanmar, EE UK, StarHub and 3 Indonesia, and Nokia AVA was rated the leading telco artificial intelligence ecosystem by Analysys Mason.

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The launch of Security Risk Index and Managed Security Service helps to ensure CSPs can protect their networks against threats. In addition to addressing their own security needs, CSPs can white-label Managed Security Services to enterprises under their own brand, which offers revenue potential in the fast-growing enterprise security market.

Nokia Cloud Collaboration Hubs were opened in Singapore, Irving (Texas) and Reading (UK). The hubs are execution centers where multi-vendor cloud services from strategy and design to execution and delivery are provided.

We expanded our offering for smart cities and public safety by launching Advanced Command Center, which enables better decision-making by strengthening situational awareness, and improves emergency response by utilizing video communications, IoT, analytics and automation.

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IP/Optical Networks

Market overview

The primary market for our IP/Optical Networks business group includes routing and optical technologies and related services sold to CSPs. This market includes technologies such as IP aggregation, edge and core routing, mobile packet core, wavelength division multiplexing, and packet optical transport networking solutions. We also have analytics and end-to-end SDN solutions.

A growing portion of our IP/Optical Networks revenue is derived from adjacent markets, which include customer segments like webscale companies and enterprises. In the enterprise segment, we address verticals like TEPS and support hyperscale networking for health care, finance and retail enterprises. We address these mission-critical markets with our IP, optical and Nuage Networks portfolios.

Business overview and organization

For our IP/Optical Networks business group, we provide the highly reliable and massively scalable networks that underpin the digital world's dynamic interconnectivity. Our portfolio of robust and innovative software, systems and services play across multiple domains, from programmable IP and optical transport networks for the smart fabric to analytics and software-defined capabilities for the programmable network operating system and more.

CSP networks are under tremendous pressure from cloud-based applications, ultra-broadband evolution and the Industrial IoT. Our IP and optical networking solutions reduce time to market and risk as CSPs launch new services, enabling rapid scaling to meet surging demands with optimal configurations. Our insight-driven network automation solutions help to further ensure that network services are delivered with consistent quality, reliability and security and that restorative actions are automatically initiated when any parameter varies beyond set limits. These carrier-grade attributes also address the needs of – and are valued by – our webscale, TEPS and large enterprise customers.

The IP/Optical Networks product portfolio includes:

- § comprehensive IP and optical wide area network (WAN) solutions that dynamically, reliably and securely connect people and things from any universal broadband access modality to any clouds and edge clouds at the lowest cost per bit;
- § advanced cloud-optimized IP service gateways for residential, business, mobile and Industrial IoT services and unique hybrid solutions enabling a converged services future;
- § analytics and carrier SDN solutions for insight-driven network automation that dynamically provide, optimize and assure network services and resources end-to-end, from access to the cloud and spanning IP and optical technology layers;
- § advanced data center automation and software-defined WAN solutions that configure network connectivity among clouds and to any enterprise branch office with the ease and efficiency of cloud compute using products from our Nuage portfolio; and
- § an extensive portfolio of professional services to accelerate the benefits of integrating new technologies to transform networks and leverage the latest innovations in SDN, virtualization and programmable IP and optical networks.

Competition

Our competitive landscape in this space includes Cisco, Juniper Networks and Huawei, in addition to various specialized players in optical such as Ciena.

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2018 highlights

The IP/Optical Networks business group launched the next generation of our Photonic Service Engine (PSE) family of super-coherent digital signal processors, underscoring Nokia's leading position in the industry and innovation pedigree. The Nokia PSE-3 will be instrumental in the evolution of CSP and webscale networks to meet the surging traffic demands of video, cloud and 5G by maximizing the capacity and performance of every link in their optical networks.

Telia Company selected Nokia's cloud packet core solution to profitably deliver enhanced mobile broadband, and to provide the massively scalable platform required as part of Telia's Next Generation Core.

Telefónica Spain selected our high-performance routing and Nuage Networks Virtualized Cloud Services to build an open, elastic and secure data center network, greatly expanding the agility, scale and efficiency of its cloud-based services.

We won a five-year contract with Polish PKP Polskie Linie Kolejowe to deploy a nationwide turnkey GSM-R and mission-critical backhaul network to enhance railway security and reliability throughout the country. Our largest-ever GSM-R contract will provide PKP/PLK with one of the biggest state-of-the-art railway communications networks in Europe.

We introduced the latest release of the Nuage Networks Virtualized Network Services (VNS) platform, SD-WAN 2.0, offering the most powerful and secure end-to-end network governance across a multi-cloud environment, with complete visibility and control from a single management interface.

Proximus announced as part of its migration to its Terabit IP Transport Aggregation Network, TITAN, that it was among the first in the world to deploy Nokia's next-generation 7750 Service Router 14S, the first routers equipped with multi-terabit processors – a technological leap in the industry.

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Nokia Software

Market overview

As service providers and large enterprises seek to modernize their businesses by leveraging 5G, they are propelling a clear growth market in telecommunications. The Nokia Software portfolio is designed to help customers accelerate their digital reinvention and power the Fourth Industrial Revolution. Our network-agnostic and cloud-native software solutions:

- § enrich and monetize digital experiences;
- § fuel operations through automation and intelligence;
- § increase network agility and advanced functionality; and
- § provide innovative emerging technologies.

In this business space we sell primarily to a CSP market and Nokia Software continues to expand into new vertical markets and emerging technologies.

Business overview and organization

The Nokia Software business has an important edge over traditional software vendors. Rooted in our deep understanding of our customers' networks, we bridge the gap between their business and their network with a level of intelligence unparalleled for our industry. Our mission is to help our customers operate in digital time – modernizing the slow, siloed and monolithic systems that weigh them down today with more agile, intelligent and lightweight solutions. By rebuilding our software applications on a Common Software Foundation, we are increasing innovation velocity while at the same time ensuring that our products are easier to deploy, use and maintain. Our modern software solutions are based on five key principles: extreme automation, actionable insight, high trust, cloud-native, and multi-vendor/multi-network capabilities.

The Nokia Software portfolio contains:

- § Digital experience and monetization: enables service providers to identify and act upon the small windows of digital time where the opportunities to enrich and monetize are the most impactful. Our portfolio includes solutions for omni-channel customer engagement, customer experience network analytics, fixed and mobile device management, and policy and charging. Today we have more than 400 digital experience and monetization customers, we are the market leader in both fixed and mobile device management and we have the industry's first cloud-native 5G charging solutions.
- § Digital operations: helps service providers simplify, automate and optimize their service and network operations. Our portfolio includes solutions for service fulfillment, assurance, orchestration and network management. We have more than 500 digital operations customers globally, hold leading market positions in NFV MANO and service assurance, and have been recognized as the “one-stop shop for Operations Support Systems” by Analysys Mason.
- § Digital networks: software that creates an elastic, programmable and secure cloud-based foundation to address performance and reliability requirements. Our products include one of the industry's first cloud-native session border controllers, a portfolio of active security solutions, and market-leading mobile network management solutions. As of 2019 Nokia's cloud core portfolio of products and services is included in this portfolio in an effort to improve customer focus.

Competition

Nokia is #1 in sales of telecom software products and is one of only two large players in the market that are stable and growing, according to Analysys Mason. However, this market remains highly fragmented, with more than half of the market served by niche players or in-house custom solutions. As such, we see significant opportunity to increase our

market share.

Our competitors fall into two categories: independent software vendors (ISVs) and network equipment providers (NEPs). The main ISV competitors are Amdocs, Netcracker and Oracle. This is an area where we see increasing competition from niche players. The main NEP competitors are Huawei and Ericsson, selling software as part of large infrastructure deals.

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2018 highlights

As part of Nokia's strategy to build a software business at scale, the Nokia Software business group has been sharply focused on building a specialized software sales force, expanding and modernizing our portfolio, and transforming our delivery and support capabilities. We are excited to see the impact of these small and large changes as we model our balance sheet, go-to-market, R&D and services on those of traditional software companies.

2018 product innovations include:

Unveiled the latest version of our Cognitive Analytics for Customer Insight software, bolstering our Customer Experience Index (CEI) with machine learning and intelligent automation to improve accuracy of predicting customer satisfaction and provide intelligent, digital-time recommendations for next-best automated and human actions to address subscriber issues.

Launched a new cloud-native Enterprise Session Border Controller (eSBC) that brings secure, ultra-high-quality IP voice and video services to enterprise customers.

Acquired SpaceTime Insight to expand our IoT software portfolio and accelerate vertical application development.

The new release of our CloudBand NFV and orchestration solution gained significant market traction, propelled by new cloud management capabilities improving service delivery and significantly reducing operating costs, as 5G deployments get underway.

Enriched our NetGuard security, operations, augmented intelligence, network and experience capabilities to support Nokia's 5G Future X network architecture.

Operational and organizational highlights include:

Strengthened our dedicated software sales force and recruited experienced software sales people across the globe.

Continued to drive the adoption of a Common Software Foundation to make our software easier for customers to integrate, deploy and use; strengthened our DevOps capabilities to get features to market faster; and standardized performance and reliability testing to ensure our products exceed telco-grade standards.

Increased the value of our service practice with a Common Delivery Framework, investment in key skills like data science, NFV on-boarding, security and monetization.

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Nokia Enterprise

Market overview

In 2018 Nokia successfully addressed the enterprise customer segment. Recognizing the growth potential of our business within this segment, we created a new business group, Nokia Enterprise, effective January 1, 2019. Our Enterprise business group addresses the mission- and business-critical networking requirements of asset-intensive industries such as transportation, energy, manufacturing and logistics – as well as governments and smart cities. The business group also supports hyperscale networking for health care, finance and retail enterprises and webscale players.

Business overview and organization

Nokia has a strong track record of helping enterprises modernize the communications networks they rely on to supervise and manage a range of operations, employing technologies across the IP, optical, microwave, fixed and mobile access domains. To date we have deployed more than 1 000 such networks across our key target vertical markets.

Today a range of enterprises are looking to harness major technology shifts in areas such as ubiquitous connectivity, analytics, cloud and the Industrial IoT to digitalize and automate critical processes and drive massive gains in business and industrial productivity.

Enterprises can benefit from digitalization, better asset management, improved processes, deeper levels of network security and new business models that will arise from pervasive connectivity.

High-performance networking is at the nexus of these trends, addressing the demand for pervasive connectivity with smart network infrastructure (increasingly wireless) that seamlessly connects everyone and everything, everywhere. Our proven enterprise portfolio provides the foundation for more than 1 000 mission-critical networks, incorporating technologies from across Nokia's Access, IP/Optical Networks, Software and Global Services portfolios, coupled with enterprise-specific products for digital automation, analytics and IoT.

This end-to-end portfolio supports the Future X for industries network architecture developed by Nokia Bell Labs, a blueprint for future industrial networks that intelligently combines high-performance, ubiquitous access and intelligent IP/optical networks with agile multi-cloud-enabled solutions, analytics-driven digital value platforms and business applications – with security capabilities embedded at all levels – to support industrial automation.

We are also driving the adoption of multi-cloud, IoT and automation with strategic investments in emerging technologies such as SDN, data center and SD-WAN applications and more. Notable developments in 2018 include the launch of the Nokia Digital Automation Cloud – our plug-and-play private wireless connectivity and automation platform designed for Industrial IoT applications; and the combination of Nokia's 2018 acquisition of SpaceTime Insight with the company's home-grown scene analytics innovations.

The Enterprise business group targets a select group of industries, which includes the following:

Transportation, energy and public sector (TEPS)

We expect our networks to be the foundation for next-generation smart grids that effectively match energy generation with demand and help power utilities explore new energy distribution models. We provide oil, gas and mining companies with private LTE networks to bring new levels of performance to a range of mission-critical operations,

protecting lives and increasing productivity.

For railway, highway, aviation and maritime industries, we build operational technology networks that support railway signaling, airport communications, air traffic control, digital signage and toll collection, and on-board broadband and infotainment.

Nokia's technology helps first responders save lives, supporting traditional two-way radio communications, while laying the foundation for advanced control centers and the data-rich mobile broadband services to enhance situational awareness and operational intelligence.

As cities seek to become smarter, Nokia offers a platform-based approach to support the connectivity, data sharing and usage control capabilities needed for smarter parking, lighting, traffic management and other municipal services. And we are partnering with governments and new network providers to bring broadband to remote, under-served communities.

Hyperscale enterprise

Nokia offers hyperscale enterprises a comprehensive solution set to help them meet their data needs while addressing stringent compliance, privacy and security requirements. Nokia solutions enable the connection of enterprise branches to clouds, both public and private, to enable their users to use their business applications from anywhere, over any broadband network. Nokia delivers IP, optical and SDN solutions to enable this connectivity.

Webscale companies

The webscale companies are a select group of enterprises that handle millions of transactions per day, demand hyper-efficiency in content delivery and support exceptional online experiences. We enable these companies to intelligently and instantaneously scale their services through automated cloud-based global service delivery platforms with robust cybersecurity features by leveraging our intelligent IP and optical networking solutions.

Competition

The competitive landscape for the enterprise space is broad and includes many specialized players focused on specific markets. The primary players active in supplying high-performance networking and mission-critical fixed and mobile communications technologies across a range of market segments include Nokia, Cisco, Juniper, Huawei and Ericsson.

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2018 highlights

- § Uptake of private LTE for enterprises accelerated in 2018, with projects including a deployment with China Unicom of a smart manufacturing solution at a BMW facility; a rollout for the Brazilian power distributor Elektro to strengthen the company's power grid reliability and operating efficiency; and an installation at the Port of HaminaKotka, the biggest in Finland, with Ukkoverkot.
- § Nokia solidified its leadership position in private LTE for mining, supporting the digitalization and automation to make mines safer, more productive and sustainable. In 2018 Nokia demonstrated these capabilities for both underground mining vehicles and open-pit, ultra-class mining trucks and automated haulage systems in collaboration with key industry leaders including Sandvik and Komatsu.
- § We launched a variety of innovative smart city projects, including an agreement to power BSNL's Smart Telecom Pole project, providing connectivity integrated with smart LED lighting, environmental sensors and more; a collaboration with Dell EMC for delivery of goods using semi-autonomous barges in the Dutch city of Delft; and a joint USD 2 billion CAD program with Smart City Capital, LLC to foster smart city projects in Canada.
- § In the transportation arena, Nokia announced its largest-ever GSM-Railway contract with Polish PKP Polskie Linie Kolejowe and launched a jointly developed solution with our partner Altran to optimize and streamline the maintenance of rolling stock for railway operators.
- § Nokia has expanded its push into the health-care segment with continued ground-breaking cloud advances at University of Pittsburgh Medical Center and Oulu University Hospital.
- § In the webscale space, Nokia and Tencent are collaborating to accelerate 5G webscale research and applications to benefit millions of internet users in China.
- § Nokia's Nuage Networks has built on its strong performance in the next-generation SD-WAN market with recent contracts with Cogeco Peer1 and e-QUAL. This is further building on top of the SD-WAN services being offered by more than 50 service provider partners globally, including BT, Telefónica, Cox, Telus, NTT Netmagic and Etisalat.

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Nokia Technologies

Market overview

Nokia Technologies is focused on licensing Nokia intellectual property, including patents, technologies and the Nokia brand, building on Nokia's continued innovation and decades of R&D leadership in technologies used in virtually all connected devices used today.

Business overview and organization

Following the sale of our Digital Health business in 2018, Nokia Technologies has exited the direct-to-customer market and is now focused on licensing.

§ Our Patent Business continues to grow its successful patent licensing and monetization activities, which drive most of Nokia Technologies' net sales.

§ Our Technology Licensing business is focused on licensing innovative spatial audiovisual technologies to smartphone and camera manufacturers.

§ Our Brand Partnerships business works with our exclusive licensee for the Nokia brand for phones and tablets, HMD Global, which has launched 12 new Android smartphones and five new feature phones during 2018.

In addition, our Intellectual Property organization manages the Nokia patent portfolio, working with all other Nokia businesses.

Sales and marketing

Our Patent Business is responsible for monetizing our intellectual property by making our innovations available to the markets through licensing activities and transactions. Nokia Technologies currently has more than half of the mobile phone market by volume under license.

Nokia Technologies also continues to engage in global sales and marketing activities supporting the technology licensing of our innovative audiovisual solutions such as OZO Audio.

Nokia Technologies sees further opportunities in licensing its proprietary technologies, intellectual property and brand assets into further markets such as Internet of Things and related industries.

Research and development

The applied nature of our R&D in the Finland-based Media Technologies Research Lab in Nokia Technologies has resulted in various relevant and valuable inventions in areas that we believe are important for emerging consumer experiences, such as audio standardization.

Patents and licenses

For more than 20 years, we have defined many of the fundamental technologies used in virtually all mobile devices and taken a leadership role in standards setting. As a result, we own a leading share of essential patents for GSM, 3G radio and 4G LTE technologies. We are a leading contributor to the development of 5G standards and declared more than 1 400 patent families for the standard during 2018, with more to follow. We expect to also have a leading position in 5G standards essential patents.

As part of our active portfolio management approach, we are continuously evaluating our collective assets and taking actions to optimize the size of our overall portfolio while preserving the high quality of our patents. At the end of 2018, our portfolio stands at around 20 000 patent families, built on combined R&D investments of more than EUR 126 billion over the last two decades.

We continue to refresh our portfolio from R&D activities across all Nokia businesses, filing patent applications on more than 1 300 new inventions in 2018.

8 At Mobile World Congress in February, Nokia Technologies launched its Patient Care Platform to enable doctors to remotely monitor patients with their smart devices. The platform, which is being used in a trial by the UK's National Health Service, aims to better prevent and manage chronic health conditions and drive timely and targeted patient care.

During the year, Nokia signed a number of patent licensing agreements, including with Apple, Huawei, LG Electronics and Xiaomi. Our agreements with Apple and Xiaomi also include broader business collaborations.

Our exclusive brand licensee for phones and tablets, HMD Global, launched six new Nokia branded Android smartphones and five new Nokia branded feature phones during its first year of operations. The new products have achieved outstanding net promoter (NPS) scores.

2018 highlights

Following the strategic review of options for the Digital Health consumer products business announced in February 2018, the sale of the business was closed in May 2018, following which Nokia Technologies was focused on licensing.

During the year, Nokia signed a number of patent licensing agreements, including the extension of our agreement with Samsung, as well as a new agreement with China's OPPO. We also joined the Avanci licensing platform, to increase licensing choices for automotive companies.

Our exclusive brand licensee for phones and tablets, HMD Global, launched 12 new Nokia branded Android smartphones and five new Nokia branded feature phones during its second year of operations. According to Counterpoint Research Q3 2018 figures, HMD Global is now a top ten smartphone manufacturer globally and among the top five in more than 30 markets including the UK.

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New patent filings in 2018

1 300+

R&D investment over the last two decades

~EUR 126bn

Patent licensees

100+

27

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Nokia Bell Labs

Nokia Bell Labs is the world-renowned industrial research and innovation arm of Nokia.

Over its 93-year history, Nokia Bell Labs has invented many of the foundational technologies that underpin information and communications networks and all digital devices and systems.

This research has resulted in nine Nobel Prizes (including one in 2018), two Turing Awards, three Japan Prizes and a plethora of National Medals of Science and Engineering, as well as an Oscar, two Grammys and an Emmy for technical innovation. Nokia Bell Labs continues to conduct disruptive research focused on solving the challenges of the new digital era, defined by the contextual connection and interaction of everything and everyone.

With Nokia Bell Labs, we search for the fundamental limits of what is possible, rather than being constrained by the current state of the art.

We look to the future to understand essential human needs and the potential barriers to enabling this new human existence. We then use our unique diversity of research intellects, disciplines and perspectives to solve the key complex problems by aiming to discover or invent disruptive innovations that have the power to enable new economic capabilities, new societal behaviors, new business models and new types of services – in other words, to drive human and technological revolutions.

Our research is focused on key scientific, technological, engineering or mathematical areas that require ten times or more improvement in one or more dimensions. We then combine these areas of research into the Future X network architecture, which aims to bring these disruptive research elements together into industry-redefining solutions. These innovations are brought to market through our business groups or through technology and patent licensing. Nokia Bell Labs also engages directly with the market and customers through our consulting practice to help define the path to the future network with business model innovation and the optimum techno-economics.

This model of defining future needs and inventing game-changing solutions to critical problems while advising the market on the path forward has been the constant mission of Nokia Bell Labs.

Nokia Bell Labs is structured into three functional areas to optimize how we create a foundation to disrupt and transform the future:

- § The Chief Technology Office defines Nokia’s technological and architectural vision and drives industry standards and initiatives.
- § Nokia Bell Labs Research understands key challenges in the future vision and invents solutions that are ten times better than what is currently possible.
- § Bell Labs Consulting advises the industry on the economics of our vision and how to efficiently achieve this future goal from the current starting point.

Arthur Ashkin wins The Nobel Prize in Physics 2018

Arthur Ashkin, a former Bell Laboratories researcher, was awarded the 2018 Nobel Prize in Physics “for the optical tweezers and their application to biological systems” on October 2, 2018.

Arthur Ashkin shares the prize with Gérard Mourou and Donna Strickland, “for their method of generating high-intensity, ultra-short optical pulses.” The Royal Swedish Academy of Sciences administers the Nobel Prize for

Physics and said they were awarding this year's winners "for groundbreaking inventions in the field of laser physics."

Arthur Ashkin was born on September 2, 1922 (age 96) in Brooklyn, New York. He received a B.A. in physics from Columbia College in 1947 and a Ph.D. in nuclear physics from Cornell University in 1952. Ashkin worked at the Columbia Radiation Lab from 1942 to 1945 while in the Army. In 1952, he joined AT&T Bell Laboratories and started working in the microwave field and then switched to laser research.

Arthur Ashkin invented optical tweezers that grab particles, atoms, viruses and other living cells with their laser beam fingers. As is always the case at Bell Labs, the breakthrough came as a byproduct of research in the fundamentals of communications – in this case, optical communications research into non-linear optical systems. Out of his work on advanced laser optics came the ability to use optical 'pressure' from high powered lasers to control microscopic particles. A major breakthrough came in 1987, when Ashkin used optical tweezers to capture living bacteria without harming them. The optical tweezers he pioneered are now widely used to investigate the machinery of life.

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2018 highlights

The 2018 Nobel Prize in Physics was awarded to Arthur Ashkin for his invention of Optical Tweezers while working at Nokia Bell Labs.

Nokia Bell Labs demonstrated 5G wireless access speeds of more than 10Gb/s using a pioneering low-cost, massive-scale antenna array system at 90 GHz, as well as mission-critical control of industrial robots over 5G networks with millisecond latency.

Nokia's PSE 3 chipset is the world's first to implement probabilistic constellation shaping (PCS), a technique pioneered by Nokia Bell Labs, which pushes theoretical limits by increasing optical network capacity up to 65% while reducing power by 60%.

Nokia Bell Labs created the World Wide Streams (WWS) platform as the world's first global-scale network foundation for sharing, transforming and publishing live data streams generated by the billions of emerging IoT devices.

The Future X Lab in Murray Hill, New Jersey was created to showcase Nokia's portfolio and Nokia Bell Labs' research innovations for the 5G Future X network, with unprecedented levels of automation and support for advanced network slicing with latency, bandwidth, reliability, scalability and optimized economics, for all future use cases in the industrial automation era.

Bell Labs Consulting is publishing the sequel to the highly successful Future X Network book, focused on applying the Future X vision to all the major industrial segments, and describing how productivity will be massively enhanced in the coming industrial revolution.

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Principal industry trends
affecting operations

Business-specific trends

Networks business

We are a leading vendor in the network and IP infrastructure, software, and the related services market. We provide a broad range of products, from the hardware components of networks used by communications service providers and increasingly by customers in other select verticals, to network agnostic software solutions, as well as services to plan, optimize, implement, run and upgrade networks. Our Networks business is conducted through six business groups: Mobile Networks, Fixed Networks, Global Services, IP/Optical Networks, Nokia Enterprise and Nokia Software. These business groups provide an end-to-end portfolio of hardware, software and services to enable us to deliver the next generation of leading networks solutions and services to our customers. We aim for all six business groups to be innovation leaders, drawing on our frontline R&D capabilities to deliver leading products and services for our customers, and ultimately ensure our long-term value creation. For more information on the Networks business refer to “Business overview—Networks business” above.

Industry trends

The network and IP infrastructure, software and related services industry has witnessed certain prominent trends in recent years, which have also affected our Networks business. First, the increase in the use of data services and the resulting exponential increase in data traffic has resulted in an increased need for high-performance, high-quality and highly reliable networks. This trend is one of the leading drivers for the start of the 5G cycle, which has been accelerated by communications service providers, as evidenced by our growing order book. The continuing increase in data traffic has, however, not been directly reflected in communications service providers’ revenue. Consequently, there is an increased need to be efficient and cost competitive for both communications service providers and network infrastructure and services vendors.

Second, we are witnessing continued consolidation among communications service providers, driven by their desire to provide a wider scope of services, especially through the convergence of disparate network technologies across mobile, fixed, and IP and optical networks. In order to improve networks in terms of coverage, capacity and quality, communications service providers are continuing their transition to all-IP architectures, with an emphasis on fast access to their networks through copper, fiber, LTE and single RAN access and new digital services delivery. We are also seeing similar trends with cable operators, who are investing in the deployment of high-speed networks. Our end-to-end portfolio of products and services can be utilized to address both the fixed mobile convergence and the transition to all-IP architectures.

Third, we see an increasing demand for large high-performance networks in some key areas outside the traditional communications service provider space, which we define as select vertical markets. Webscale companies and extra-large enterprises - such as Apple, Facebook, Google, Alibaba and Amazon - are investing in cloud technology and network infrastructure to build these high-performing, secure networks. In addition, other target vertical markets such as energy, transportation and the public sector are investing to build carrier-grade, mission-critical networks.

The first three pillars of our strategy are aligned with these industry trends for our Networks business. We continue to execute well on our strategy, with a particular focus on high-performance, end-to-end networks, expansion into new select verticals and building a new network-agnostic software business. To accelerate this momentum and increase customer focus as the 5G era begins, we announced plans to realign parts of our organization according to our strategy on October 25, 2018. More information about these plans can be found in “Business overview—Our strategy”.

Pricing and price erosion

In 2018, we did not witness a dramatic change in the overall competitive environment in our industry. We did witness some pricing pressure from a small number of large customers funding their 5G entry within their existing budget plans.

Product mix

The profitability of our Networks business is affected by our product mix, including the share of software in the sales mix. This is particularly evident during large technology cycles, as initial deployments consist of a larger portion of hardware and services and less software. This ratio shifts more towards higher-margin software further into the cycle, as additional capacity and features are deployed. As the initial phases of deployments tend to be lower margin, this is offset by the ongoing deployment of previous generation technologies, which tend to be higher margin.

Products and services also have varying profitability profiles. For instance, our Ultra Broadband Networks and IP Networks and Applications reportable segments offer a combination of hardware and software, which generally have higher gross margins, but also require significant R&D investment, whereas the Global Services reportable segment has offerings that are typically labor-intensive, while carrying low R&D investment, and have relatively low gross margins compared to the hardware and software products.

Seasonality and cyclical nature of projects

Net sales in our Networks business are affected by seasonality in the spending cycles of communications service providers, with generally higher sales in the fourth quarter, followed by generally lower sales in the first quarter. In addition to normal industry seasonality, there are normal peaks and troughs in the deployment of large infrastructure projects. As an example, the 5G technology cycle has accelerated over the past year, as commercial deployments started in 2018 and are expected to continue in 2019 and beyond. The timing of these projects depends on a number of factors, including new radio spectrum allocation, network upgrade cycles and the availability of new consumer devices and services, which in turn could affect the net sales of our Networks business.

Continued operational efficiency improvements

In 2018, our Networks business continued to focus on operational improvements across its business groups, in an effort to complete the cost savings program put in place following the acquisition of Alcatel Lucent. Upon completion of the Alcatel Lucent integration as of the end of 2018, we are now moving to the next phase of restructuring, where we will focus on optimization and ensuring that we are lean in every part of our business. In order to continue to make our Networks business more efficient, higher-performing and positioned for long-term success, we aim to further strengthen our productivity, efficiency and competitive cost structure through strong operational discipline.

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Accordingly, on October 25, 2018, we announced a new cost reduction program where we intend to target substantial savings while continuing to make further investments to drive future growth and higher returns. The savings are expected to come from a wide range of areas, including investments in digitalization to drive more automation and productivity, further process and tool simplification, significant reductions in central support functions to reach best-in-class cost levels, prioritization of R&D programs to best create long-term value, a sharp reduction of R&D in legacy products, driving efficiency from further application of our common software foundation and innovative software development techniques, the consolidation of selected cross-company activities and further reductions in real estate and other overhead costs.

Cost of components and raw materials

There are several important factors driving the profitability and competitiveness of our Networks business: scale, operational efficiency, pricing, and cost discipline. The costs of our networks products are comprised of, among others, components, manufacturing, labor and overheads, royalties and licensing fees, depreciation of product machinery, logistics and warranty and other quality costs.

Nokia Networks' profitability can be affected by changes in the sales volume, as well as the requirement to source large volumes of components on short notice, which can impact the cost of sales, or in cases where component shortages emerge, the net sales.

Nokia Technologies

Nokia Technologies is focused on pursuing new licensing opportunities for our valuable intellectual property, including patents, innovative technologies and know-how, and the Nokia brand.

The Nokia Technologies strategy consists of: 1) patent licensing, where we license standard-essential and other patents in the Nokia portfolio to companies in the mobile devices market and beyond; 2) technology licensing, focused on licensing proprietary audio visual technologies to enable licensees to build more innovative products; and 3) brand licensing, enabling licensees to leverage the value of the Nokia brand in consumer markets.

Following a review of strategic options for Nokia's Digital Health business, which used to be a part of Nokia Technologies, in May 2018 we announced and closed the sale of this business to Eric Carreel, co-founder and former chairman of Withings.

Monetization strategies of IPR

Success in the technology industry requires significant R&D investment, with the resulting patents and other Intellectual Property Rights (IPR) utilized to protect and generate a return on those investments and related inventions. We believe we are well-positioned to protect, and build on, our existing industry-leading patent portfolio, and consequently to increase our shareholders' value.

We see a number of means of monetizing these opportunities: on the one hand, we seek to license our patent portfolio, and new technological innovations that can be integrated into other companies' products and services. On the other hand, we also engage in brand licensing to leverage the Nokia brand in consumer devices.

In patent licensing, the main opportunities we are pursuing are: (1) renewing existing license agreements and negotiating new license agreements with mobile phone manufacturers; and (2) expanding the scope of licensing activities to other industries, in particular those that implement mobile communication technologies such as automotive and consumer electronics. Following the sale of our Devices and Services business in 2014, we no longer

need patent licenses for our own mobile phone business, enabling the possibility of improving the balance of inbound and outbound patent licensing.

In brand licensing, we will continue to seek further opportunities to bring the Nokia brand into consumer markets, by licensing our brand and other intellectual property. We continue to work with HMD Global, our exclusive licensee for the Nokia brand for phones and tablets, who has launched 12 new Android smartphones and five new feature phones during 2018.

In technology licensing, our newest business, the opportunities are more long-term in our view, but we will look at opportunities to license technologies developed by Nokia Technologies which can be integrated by licensees into their products and services.

General trends in IPR licensing

In general, there has been increased focus on IPR protection and licensing in the market, and this trend is expected to continue. As such, new agreements are generally a product of lengthy negotiations and occasionally through arbitration or litigation, and therefore the timing and outcome may be difficult to forecast. Due to the structure of patent license agreements, the payments may be infrequent, at times may be partly retrospective, and the lengths of license agreements can vary.

Additionally, there are clear regional differences in the ease of protecting and licensing patented innovations. We have seen some licensees actively avoiding making license payments, and some licensors using aggressive methods to collect them; both behaviors have attracted regulatory attention. We expect discussion of the regulation of licensing to continue at both global and regional level. Some of those regulatory developments may be adverse to the interests of technology developers and patent owners, including us.

Research, development and patent portfolio development

As the creation of new technology assets and patented innovations is heavily focused on R&D activities with long lead-times to incremental revenues, we may from time to time see investment opportunities that have strategic importance. This generally affects operating expenses before sales reflect a return on those investments.

Financial markets trends

We are a company with global operations and net sales derived from various countries, invoiced in various currencies. Therefore, our business and results from operations are exposed to changes in exchange rates between the euro, our reporting currency, and other currencies, such as the U.S. dollar and the Chinese yuan. The magnitude of foreign exchange exposures changes over time as a function of our net sales and costs in different markets, as well as the prevalent currencies used for transactions in those markets. Significant changes in exchange rates may also impact our competitive position and related price pressures through their impact on our competitors.

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To mitigate the impact of changes in exchange rates on our results, we hedge material net foreign exchange exposures (net sales less costs in a currency) typically with a hedging horizon of approximately 12 months. For the majority of these hedges, hedge accounting is applied to reduce income statement volatility.

In 2018, approximately 25% of Group net sales and approximately 30% of Group total costs were denominated in euro. In 2018, approximately 45% of Group net sales and total costs were denominated in U.S. dollars and approximately 10% in Chinese yuan.

The average currency mix for Group net sales and total costs:

Currency	2018		2017	
	Net sales	Total costs	Net sales	Total costs
EUR	~25 %	~30 %	~25 %	~30 %
USD	~45 %	~45 %	~45 %	~45 %
CNY	~10 %	~10 %	~10 %	~10 %
Other	~20 %	~15 %	~20 %	~15 %
Total	~100 %	~100 %	~100 %	~100 %

During 2018, the U.S. dollar first depreciated against the euro but then started appreciating against the euro from the second quarter onwards. Overall for the full year 2018 compared to previous year, the U.S. dollar was weaker against the euro on year-on-year basis and this had a negative impact on our net sales reported in euros. However, the weaker U.S. dollar on year-on-year basis also contributed to lower cost of sales and slightly lower operating expenses. In total, before hedging, the weaker U.S. dollar on year-on-year basis had an approximately neutral effect on our operating profit in 2018.

For the full year 2018 compared to previous year, the Chinese yuan was weaker against the euro on year-on-year basis and this had a slightly negative impact on our net sales expressed in euros. However, the weaker Chinese yuan on year-on-year basis also contributed to slightly lower cost of sales and operating expenses. In total, before hedging, the weaker Chinese yuan on year-on-year basis had an approximately neutral effect on our operating profit in 2018.

For a discussion of the instruments used by us in connection with our hedging activities, refer to Note 36, Financial risk management of our consolidated financial statements included in this annual report on Form 20-F. Refer also to “Operating and financial review and prospects—Risk factors”.

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Results of operations

The financial information included in this “Operating and financial review and prospects” section as of December 31, 2018 and 2017 and for each of the three years ended December 31, 2018, 2017 and 2016 has been derived from our audited consolidated financial statements included in this annual report on Form 20 F. The financial information as of December 31, 2018 and 2017 and for each of the three years ended December 31, 2018, 2017 and 2016 should be read in conjunction with, and is qualified in its entirety by reference to, our audited consolidated financial statements.

At the end of 2018, we had two businesses: Nokia’s Networks business and Nokia Technologies, and four reportable segments for financial reporting purposes: (1) Ultra Broadband Networks, (2) Global Services and (3) IP Networks and Applications within Nokia’s Networks business; and (4) Nokia Technologies. We also present certain segment-level information for Group Common and Other as well as for Discontinued operations. In 2018 the Group applied IFRS 9, Financial Instruments, and IFRS 15, Contracts with Customers, for the first time. The financial information as of December 31, 2017 and for the years ended December 31, 2017 and 2016 has not been restated for the effects of the new accounting standards. Refer to Note 3, New and amended standards and interpretations, in the consolidated financial statements.

Continuing operations

For the year ended December 31, 2018 compared to the year ended December 31, 2017

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2018		2017		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	22 563	100.0	23 147	100.0	(3)
Cost of sales	(14 117)	(62.6)	(14 008)	(60.5)	1
Gross profit	8 446	37.4	9 139	39.5	(8)
Research and development expenses	(4 620)	(20.5)	(4 916)	(21.2)	(6)
Selling, general and administrative expenses	(3 463)	(15.3)	(3 615)	(15.6)	(4)
Other income and expenses	(422)	(1.9)	(592)	(2.6)	(29)
Operating (loss)/profit	(59)	(0.3)	16	0.1	–
Share of results of associated companies and joint ventures	12	0.1	11	–	9
Financial income and expenses	(313)	(1.4)	(537)	(2.3)	(42)
Loss before tax	(360)	(1.6)	(510)	(2.2)	(29)
Income tax expense	(189)	(0.8)	(927)	(4.0)	(80)
Loss for the year	(549)	(2.4)	(1 437)	(6.2)	(62)

Net sales

Net sales in 2018 were EUR 22 563 million, a decrease of EUR 584 million, or 3%, compared to EUR 23 147 million in 2017. The decrease in net sales was primarily due to a decrease in Nokia’s Networks business net sales, and, to a lesser extent a decrease in Nokia Technologies and Group Common and Other net sales.

The following table sets forth distribution of net sales by geographical area for the years indicated.

For the year ended December 31	2018 EURm	2017 EURm	Year-on-year change %
Asia-Pacific	4 081	4 228	(3)
Europe(1)	6 489	6 833	(5)
Greater China	2 165	2 516	(14)
Latin America	1 380	1 279	8
Middle East & Africa	1 874	1 907	(2)
North America	6 574	6 384	3
Total	22 563	23 147	(3)

(1) All Nokia Technologies IPR and licensing net sales are allocated to Finland.

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Gross profit

Gross profit in 2018 was EUR 8 446 million, a decrease of EUR 693 million, or 8%, compared to EUR 9 139 million in 2017. The decrease in gross profit was primarily due to lower gross profit in Nokia's Networks business and Nokia Technologies, as well as higher product portfolio integration-related costs, partially offset by lower working capital-related purchase price allocation adjustments. Gross margin in 2018 was 37.4%, compared to 39.5% in 2017. In 2018, gross profit included product portfolio integration-related costs of EUR 548 million and working capital-related purchase price allocation adjustments of EUR 16 million. In 2017, gross profit included product portfolio integration-related costs of EUR 453 million and working capital-related purchase price allocation adjustments of EUR 55 million.

Operating expenses

Our research and development expenses in 2018 were EUR 4 620 million, a decrease of EUR 296 million, or 6%, compared to EUR 4 916 million in 2017. Research and development expenses represented 20.5% of our net sales in 2018 compared to 21.2% in 2017. The decrease in research and development expenses were due to decreases in Nokia's Networks business and Nokia Technologies research and development expenses, as well as lower amortization and depreciation of acquired intangible assets and property, plant and equipment and product portfolio integration-related costs. In 2018, research and development expenses included amortization and depreciation of acquired intangible assets and property, plant and equipment of EUR 576 million, compared to EUR 633 million in 2017, as well as product portfolio integration-related costs of EUR 28 million, compared to EUR 57 million in 2017.

Our selling, general and administrative expenses in 2018 were EUR 3 463 million, a decrease of EUR 152 million, or 4%, compared to EUR 3 615 million in 2017. Selling, general and administrative expenses represented 15.3% of our net sales in 2018 compared to 15.6% in 2017. The decrease in selling, general and administrative expenses was primarily due to a decrease in Nokia Technologies selling, general and administrative expenses, lower amortization and depreciation of acquired intangible assets, and property, plant and equipment, and lower Group Common and Other selling, general and administrative expenses. Selling, general and administrative expenses included amortization and depreciation of acquired intangible assets, and property, plant and equipment of EUR 358 million in 2018 compared to EUR 394 million in 2017, as well as transaction and integration-related costs of EUR 207 million, compared to EUR 194 million in 2017.

Other income and expenses in 2018 was a net expense of EUR 422 million, a decrease of EUR 170 million, compared to a net expense of EUR 592 million in 2017. The net positive fluctuation in our other income and expenses was primarily due to lower restructuring and associated charges, lower impairment charges and a net positive fluctuation in Group Common and Other other income and expenses. These were partially offset by a net negative fluctuation in Nokia's Networks business other income and expenses, charges related to fair value changes of a legacy IPR fund and charges related to the divestment of businesses. Other income and expenses included restructuring and associated charges of EUR 319 million in 2018 compared to EUR 576 million in 2017.

In 2018, we recorded a non-cash impairment charge to other income and expenses of EUR 48 million, compared to EUR 141 million in 2017. In 2017, the charge was due to the impairment of goodwill related to our digital health business, which was part of Nokia Technologies. The impairment charge was allocated to the carrying amount of goodwill held within the digital health cash generating unit, which was reduced to zero. In 2017, we also recorded a non-cash impairment charge to other income and expenses of EUR 32 million related to acquired intangible assets in Nokia's Networks business.

Operating profit/loss

Our operating loss in 2018 was EUR 59 million, a change of EUR 75 million, compared to an operating profit of EUR 16 million in 2017. The change in operating result was primarily due to a lower gross profit, partially offset by lower research and development expenses, a net positive fluctuation in other income and expenses and lower selling, general and administrative expenses. Our operating margin in both 2018 and 2017 was approximately break even.

The following table sets forth the impact of unallocated items on operating profit/loss:

EURm	2018	2017
Total segment operating profit(1)	2 180	2 587
Amortization and depreciation of acquired intangible assets and property, plant and equipment	(940)	(1 033)
Product portfolio strategy costs	(583)	(536)
Restructuring and associated charges	(321)	(579)
Transaction and related costs, including integration costs relating to the acquisition of Alcatel Lucent	(220)	(206)
Fair value changes of legacy IPR fund	(57)	–
Impairment of assets	(48)	(173)
Divestment of businesses	(39)	–
Release of acquisition-related fair value adjustments to deferred revenue and inventory	(16)	(55)
Other	(15)	11
Total operating (loss)/profit	(59)	16

(1) Excludes costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

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Financial income and expenses

Financial income and expenses was a net expense of EUR 313 million in 2018 compared to a net expense of EUR 537 million in 2017, a decrease of EUR 224 million, or 42%. The net positive fluctuation in financial income and expenses was primarily due to the absence of EUR 220 million of costs related to the offer to purchase the 6.50% notes due January 15, 2028, the 6.45% notes due March 15, 2029, the 6.75% notes due February 4, 2019 and the 5.375% notes due May 15, 2019, that negatively impacted 2017; lower losses from foreign exchange fluctuations; and the absence of a loss on the sale of financial assets that negatively impacted 2017. This was partially offset by the absence of gains from venture fund investments, as they were no longer recognized in financial income and expenses in 2018 following the adoption of IFRS 9, and the inclusion of expenses associated with customer receivables and overdue payments in financial income and expenses as a result of the adoption of IFRS 15.

Refer to “—Liquidity and capital resources” below.

Loss before tax

Our loss before tax in 2018 was EUR 360 million, a decrease of EUR 150 million compared to a loss of EUR 510 million in 2017.

Income tax

Income taxes was a net expense of EUR 189 million in 2018, a decrease of EUR 738 million compared to a net expense of EUR 927 million in 2017. The change in net income taxes was primarily attributable to the following expenses recorded in 2017: deferred tax expense of EUR 777 million from re-measurement of deferred tax assets resulting from the tax rate change in the United States, a non-recurring tax expense of EUR 245 million related to the integration of the former Alcatel Lucent and Nokia operating models, and income taxes for prior years of EUR 139 million from the disposal of the former Alcatel Lucent railway signaling business in 2006 to Thalès. This was partially offset by three factors: higher income taxes due to increased profitability and our regional profit mix in 2018 compared to 2017, Base Erosion and Anti-Abuse Tax in the United States, enacted as part of the tax reform and applicable from 2018 onwards, and deferred tax expense resulting from the write-off of certain deferred tax assets in 2018, primarily related to foreign withholding tax credits in Finland. Refer to Note 13, Income taxes, of our consolidated financial statements included in this annual report on Form 20-F.

The United States passed a comprehensive set of tax reforms into law on December 22, 2017. The new law, known as the Tax Cuts and Jobs Act, contains several changes that are applicable to us, many of which became effective for tax years beginning in 2018. Most notably, the U.S. federal statutory tax rate was reduced from 35% to 21%. In addition, the new law made significant modifications to the taxation of cross-border transactions which we expect to have an impact on certain transactions between our subsidiaries in the United States and our subsidiaries outside the United States. Regulatory guidance with respect to the new tax law will continue be published by the U.S. tax authorities in the future and such guidance may have an impact on our cross-border transactions. We have made reasonable estimates related to the tax law’s impact in our December 31, 2018 consolidated financial statements, as appropriate.

Loss attributable to equity holders of the parent and earnings per share

The loss attributable to equity holders of the parent in 2018 was EUR 340 million, a decrease of EUR 1 154 million, compared to a loss of EUR 1 494 million in 2017. The change in profit attributable to equity holders of the parent was primarily due to lower income tax expenses and a net positive fluctuation in financial income and expenses. This was partially offset by an operating loss in 2018, compared to an operating profit in 2017.

Our total EPS from continuing operations in 2018 was negative EUR 0.10 (basic) and negative EUR 0.10 (diluted) compared to negative EUR 0.26 (basic) and negative EUR 0.26 (diluted) in 2017.

Cost savings program

On April 6, 2016, we launched a cost savings program, targeting approximately EUR 1 200 million of recurring annual cost savings to be achieved in full year 2018. At the end of 2018, we completed the restructuring activities related to this cost savings program and achieved the EUR 1 200 million of recurring annual cost savings targeted. In 2018, we recognized restructuring and associated charges of approximately EUR 300 million related to the cost savings program. Cumulative recognized restructuring and associated charges were approximately EUR 1 600 million.

In 2018, we had restructuring and associated cash outflows of approximately EUR 500 million related to the cost savings program. Cumulative restructuring and associated cash outflows were approximately EUR 1 450 million and we expect total restructuring and associated cash outflows to be approximately EUR 2 100 million, related to this cost savings program.

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For the year ended December 31, 2017 compared to the year ended December 31, 2016

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2017		2016		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	23 147	100.0	23 641	100.0	(2)
Cost of sales	(14 008)	(60.5)	(15 117)	(63.9)	(7)
Gross profit	9 139	39.5	8 524	36.1	7
Research and development expenses	(4 916)	(21.2)	(4 997)	(21.1)	(2)
Selling, general and administrative expenses	(3 615)	(15.6)	(3 767)	(15.9)	(4)
Other income and expenses	(592)	(2.6)	(860)	(3.6)	(31)
Operating profit/(loss)	16	0.1	(1 100)	(4.7)	–
Share of results of associated companies and joint ventures	11	–	18	0.1	(39)
Financial income and expenses	(537)	(2.3)	(287)	(1.2)	87
Loss before tax	(510)	(2.2)	(1 369)	(5.8)	(63)
Income tax (expense)/benefit	(927)	(4.0)	457	1.9	–
Loss for the year	(1 437)	(6.2)	(912)	(3.9)	58

Net sales

Net sales in 2017 were EUR 23 147 million, a decrease of EUR 494 million, or 2%, compared to EUR 23 641 million in 2016. The decrease in net sales was primarily due to a decrease in Nokia's Networks business net sales, partially offset by an increase in Nokia Technologies net sales.

The following table sets forth distribution of net sales by geographical area for the years indicated.

For the year ended December 31	2017 EURm	2016 EURm	Year-on-year change %
Asia-Pacific	4 228	4 223	–
Europe(1)	6 833	6 410	7
Greater China	2 516	2 654	(5)
Latin America	1 279	1 458	(12)
Middle East & Africa	1 907	1 872	2
North America	6 384	7 024	(9)
Total	23 147	23 641	(2)

(1) All Nokia Technologies IPR and licensing net sales are allocated to Finland.

Gross profit

Gross profit in 2017 was EUR 9 139 million, an increase of EUR 615 million, or 7%, compared to EUR 8 524 million in 2016. The increase in gross profit was primarily due to lower working capital-related purchase price allocation

adjustments and higher gross profit in Nokia Technologies, partially offset by lower gross profit in Nokia's Networks business and higher product portfolio integration-related costs. Gross margin in 2017 was 39.5%, compared to 36.1% in 2016. In 2017, gross profit included product portfolio integration-related costs of EUR 453 million and working capital-related purchase price allocation adjustments of EUR 55 million. In 2016, gross profit included working capital-related purchase price allocation adjustments of EUR 840 million, which resulted in higher cost of sales and lower gross profit when the inventory was sold; and product portfolio integration-related costs of EUR 274 million.

Operating expenses

Our research and development expenses in 2017 were EUR 4 916 million, a decrease of EUR 81 million, or 2%, compared to EUR 4 997 million in 2016. Research and development expenses represented 21.2% of our net sales in 2017 compared to 21.1% in 2016. The decrease in research and development expenses were due to decreases in Nokia's Networks business, Group Common and Other and Nokia Technologies research and development expenses. In 2017, research and development expenses included amortization and depreciation of acquired intangible assets and property, plant and equipment of EUR 633 million, compared to EUR 619 million in 2016, as well as product portfolio integration-related costs of EUR 57 million, compared to EUR 62 million in 2016.

Our selling, general and administrative expenses in 2017 were EUR 3 615 million, a decrease of EUR 152 million, or 4%, compared to EUR 3 767 million in 2016. Selling, general and administrative expenses represented 15.6% of our net sales in 2017 compared to 15.9% in 2016. The decrease in selling, general and administrative expenses was primarily due to lower transaction and integration-related costs, a decrease in Nokia's Networks business selling, general and administrative expenses and, to a lesser extent, Group Common and Other selling, general and administrative expenses, partially offset by an increase in Nokia Technologies selling, general and administrative expenses. Selling, general and administrative expenses included amortization and depreciation of acquired intangible assets, and property, plant and equipment of EUR 394 million in 2017 compared to EUR 386 million in 2016, as well as transaction and integration-related costs of EUR 194 million, compared to EUR 294 million in 2016.

Other income and expenses in 2017 was a net expense of EUR 592 million, a change of EUR 268 million, compared to a net expense of EUR 860 million in 2016. The net positive fluctuation in our other income and expenses was primarily due to lower restructuring and associated charges and a net positive fluctuation in Nokia's Networks business and Group Common and Other other income and expenses, partially offset by impairment charges. Other income and expenses included restructuring and associated charges of EUR 576 million in 2017 compared to EUR 759 million in 2016.

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In 2017, as a result of challenging business conditions, we recorded a non-cash charge to other income and expenses of EUR 141 million, due to the impairment of goodwill related to our Digital Health business, which was part of Nokia Technologies. The impairment charge was allocated to the carrying amount of goodwill held within the digital health cash generating unit, which was reduced to zero. In 2017, we also recorded a non-cash impairment charge to other income and expenses of EUR 32 million related to acquired intangible assets in Nokia's Networks business.

Operating profit/loss

Our operating profit in 2017 was EUR 16 million, a change of EUR 1 116 million, compared to an operating loss of EUR 1 100 million in 2016. The change in operating result was primarily due to a higher gross profit and, to a lesser extent, a net positive fluctuation in other income and expenses and lower selling, general and administrative and research and development expenses. Our operating margin in 2017 was approximately break even compared to negative 4.7% in 2016.

The following table sets forth the impact of unallocated items on operating profit:

EURm	2017	2016
Total segment operating profit(1)	2 587	2 172
Amortization and depreciation of acquired intangible assets and property, plant and equipment	(1 033)	(1 026)
Restructuring and associated charges	(579)	(774)
Product portfolio strategy costs	(536)	(348)
Transaction and related costs, including integration costs relating to the acquisition of Alcatel Lucent	(206)	(295)
Impairment of assets	(173)	–
Release of acquisition-related fair value adjustments to deferred revenue and inventory	(55)	(840)
Other	11	11
Total operating profit/(loss)	16	(1 100)

(1) Excludes costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

Financial income and expenses

Financial income and expenses was a net expense of EUR 537 million in 2017 compared to a net expense of EUR 287 million in 2016, an increase of EUR 250 million, or 87%. The net negative fluctuation in financial income and expenses was primarily due to costs of EUR 220 million related to the offer to purchase the 6.50% notes due January 15, 2028, the 6.45% notes due March 15, 2029, the 6.75% notes due February 4, 2019 and the 5.375% notes due May 15, 2019; losses from foreign exchange fluctuations; a non-recurring interest expense related to a change to uncertain tax positions; and a loss on the sale of financial assets. This was partially offset by a change in the fair value of the financial liability to acquire Nokia Shanghai Bell non-controlling interest and the absence of costs related to the early redemption of Alcatel Lucent high yield bonds, which adversely affected full year 2016.

Refer to —Liquidity and capital resources below.

Loss before tax

Our loss before tax in 2017 was EUR 510 million, a decrease of EUR 859 million compared to a loss of EUR 1 369 million in 2016.

Income tax

Income taxes was a net expense of EUR 927 million in 2017, a change of EUR 1 384 million compared to a net benefit of EUR 457 million in 2016. The change in net income taxes was primarily due to increased profitability, deferred tax expenses of EUR 777 million from re-measurement of deferred tax assets resulting from the tax rate change in the United States, a non-recurring tax expense of EUR 245 million (EUR 439 million tax benefit in 2016) related to the integration of the former Alcatel Lucent and Nokia operating models; as well as income taxes for prior years primarily from the disposal of the former Alcatel Lucent railway signaling business in 2006 to Thalès. This was partially offset by three factors: lower income taxes due to our regional profit mix in 2017 compared to 2016, lower losses than in 2016 in countries for which we do not recognize deferred tax assets, and a deferred tax benefit from re-measurement of deferred tax assets resulting from the tax rate changes (in countries other than the United States). Refer to Note 13, Income taxes, of our consolidated financial statements included in this annual report on Form 20-F.

On December 22, 2017, the United States passed a comprehensive set of tax reforms into law. The new law, known as the Tax Cuts and Jobs Act, includes numerous changes to prior tax law, including a permanent reduction in the federal corporate income tax rate from 35% to 21%. Our deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in the consolidated income statement in the period in which the law is substantively enacted. We concluded that the United States federal income tax rate reduction caused our United States deferred tax assets and liabilities to be revalued in 2017 and, therefore, recognized an additional tax provision of EUR 777 million related to such revaluation. The new tax law also contains several other changes, in addition to the reduction in the federal corporate tax rate, many of which become effective for tax years beginning in 2018. We have considered the impact all the tax reform provisions will have on us and have made reasonable estimates for certain effects in our December 31, 2017 consolidated financial statements, as appropriate.

Loss attributable to equity holders of the parent and earnings per share

The loss attributable to equity holders of the parent in 2017 was EUR 1 494 million, an increase of EUR 728 million, compared to a loss of EUR 766 million in 2016. The change in profit attributable to equity holders of the parent was primarily due to an income tax expense, compared to an income tax benefit in 2016 and a net negative fluctuation in financial income and expenses. This was partially offset by an operating profit in 2017, compared to an operating loss in 2016.

Our total basic EPS in 2017 decreased to negative EUR 0.26 (basic) and negative EUR 0.26 (diluted) compared to negative EUR 0.13 (basic) and negative EUR 0.13 (diluted) in 2016.

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Cost savings program

On April 6, 2016, we launched a new cost savings program, targeting approximately EUR 1 200 million of recurring annual cost savings to be achieved in full year 2018. In 2017, we recognized restructuring and associated charges of approximately EUR 550 million related to the cost savings program.

In 2017, we had restructuring and associated cash outflows of approximately EUR 550 million related to the cost savings program.

Discontinued operations

Discontinued operations include the continuing financial effects of the HERE business and the D&S business. The Group sold its HERE digital mapping and location services business to a German automotive industry consortium comprised of AUDI AG, BMW Group and Daimler AG in a transaction that was completed on December 4, 2015 (the sale of HERE business). The Group sold substantially all of its Devices & Services business to Microsoft in a transaction that was completed on April 25, 2014 (the sale of D&S business). Refer to Note 7, Discontinued operations, of our consolidated financial statements included in this annual report on Form 20-F.

For the year ended December 31, 2018 compared to the year ended December 31, 2017

Discontinued operations profit for the year was EUR 214 million compared to a loss of EUR 21 million in 2017. Profit for the year in 2018 mostly related to a resolution reached in the tax dispute concerning the applicability of withholding tax in respect of payments by Nokia India Private Limited to Nokia Corporation for the supply of operating software in D&S business as well as a release of uncertain tax positions related to HERE business.

For the year ended December 31, 2017 compared to the year ended December 31, 2016

Discontinued operations loss for the year was EUR 21 million compared to a loss of EUR 15 million in 2016.

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Results of segments

Networks business

For the year ended December 31, 2018 compared to the year ended December 31, 2017

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2018		2017		Year-on-year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	20 121	100.0	20 523	100.0	(2)
Cost of sales	(12 721)	(63.2)	(12 590)	(61.3)	1
Gross profit	7 400	36.8	7 933	38.7	(7)
Research and development expenses	(3 592)	(17.9)	(3 730)	(18.2)	(4)
Selling, general and administrative expenses	(2 576)	(12.8)	(2 587)	(12.6)	–
Other income and expenses	(33)	(0.2)	95	0.5	–
Operating profit	1 199	6.0	1 711	8.3	(30)

Segment information(1)

For the year ended December 31	Ultra Broadband Networks	Global Services (2)	IP Networks and Applications (3)	Networks total	Ultra Broadband Networks (2)	Global Services	IP Networks and Applications (3)	Networks total
	2018	2018	2018	2018	2017	2017	2017	2017
	EURm	EURm	EURm	EURm	EURm	EURm	EURm	EURm
Net sales	8 692	5 710	5 719	20 121	8 970	5 810	5 743	20 523
Cost of sales	(4 816)	(4 709)	(3 196)	(12 721)	(4 723)	(4 697)	(3 170)	(12 590)
Gross profit	3 876	1 001	2 523	7 400	4 247	1 113	2 573	7 933
Research and development expenses	(2 273)	(87)	(1 232)	(3 592)	(2 361)	(85)	(1 284)	(3 730)
Selling, general and administrative expenses	(1 079)	(652)	(845)	(2 576)	(1 162)	(631)	(794)	(2 587)
Other income and expenses	(14)	(20)	1	(33)	57	14	24	95
Operating profit	510	242	447	1 199	781	411	519	1 711

(1) Refer to Note 5, Segment information, of our consolidated financial statements included in this annual report.

(2) Net sales include EUR 6 712 million (EUR 6 895 million in 2017) attributable to Mobile Networks and EUR 1 980 million (EUR 2 075 million in 2017) attributable to Fixed Networks.

(3) Net sales include EUR 2 545 million (EUR 2 694 million in 2017) attributable to IP Routing; EUR 1 606 million (EUR 1 499 million in 2017) attributable to Optical Networks; and EUR 1 568 million (EUR 1 550 million in 2017) attributable to Nokia Software.

The following table sets forth distribution of net sales by geographical area for the years indicated.

For the year ended December 31	2018 EURm	2017 EURm	Year-on-year change %
Asia-Pacific	4 055	4 197	(3)
Europe	4 400	4 442	(1)
Greater China	2 147	2 466	(13)
Latin America	1 347	1 245	8
Middle East & Africa	1 859	1 897	(2)
North America	6 313	6 276	1
Total	20 121	20 523	(2)

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Net sales

Nokia's Networks business net sales in 2018 were EUR 20 121 million, a decrease of EUR 402 million, or 2%, compared to EUR 20 523 million in 2017. The decrease in Nokia's Networks business net sales was primarily due to Ultra Broadband Networks and, to a lesser extent, Global Services and IP Networks and Applications. Ultra Broadband Networks net sales were EUR 8 692 million in 2018, a decrease of EUR 278 million, or 3%, compared to EUR 8 970 million in 2017. Global Services net sales were EUR 5 710 million in 2018, a decrease of EUR 100 million, or 2%, compared to EUR 5 810 million in 2017. IP Networks and Applications net sales were EUR 5 719 million in 2018, a decrease of EUR 24 million, or approximately flat, compared to EUR 5 743 million in 2017.

The decrease in Ultra Broadband Networks net sales is comprised of a decrease in Mobile Networks net sales of EUR 183 million and a decrease in Fixed Networks net sales of EUR 95 million.

The decrease in Mobile Networks net sales was primarily due to radio networks and, to a lesser extent, core networks, partially offset by growth in microwave. From a growth perspective, small cells continued to deliver strong performance.

The decrease in Fixed Networks net sales was primarily due to broadband access, services and digital home.

The decrease in Global Services net sales was primarily due to care, network implementation, partially offset by managed services.

The decrease in IP Networks and Applications net sales is comprised of a decrease in IP/Optical Networks net sales of EUR 42 million, partially offset by an increase in Nokia Software net sales of EUR 18 million.

The decrease in IP/Optical Networks net sales was due to IP routing, partially offset by optical networks. For IP routing, net sales were adversely affected by component shortages in our supply chain, which showed signs of improvement in the latter part of 2018. For Optical Networks, the increase was primarily related to our strong product portfolio, as well as progress with targeted large enterprise vertical and webscale customers.

The increase in Nokia Software net sales was primarily due to growth in digital networks, CloudBand NFV management and orchestration, NetGuard security, network management and self-organizing network (SON). The net sales performance of Nokia Software continued to benefit from the investments to build a dedicated software sales force and increasingly strong demand for our market leading software portfolio built on a 5G ready and cloud-native Common Software Foundation.

Gross profit

Nokia's Networks business gross profit in 2018 was EUR 7 400 million, a decrease of EUR 533 million, or 7%, compared to EUR 7 933 million in 2017. Nokia's Networks business gross margin in 2018 was 36.8%, compared to 38.7% in 2017. The decrease in Nokia's Networks business gross profit was primarily due to Ultra Broadband Networks and, to a lesser extent, Global Services and IP Networks and Applications.

Ultra Broadband Networks gross profit in 2018 was EUR 3 876 million, a decrease of EUR 371 million, or 9%, compared to EUR 4 247 million in 2017. The decrease in Ultra Broadband Networks gross profit was due to Mobile Networks. The lower gross profit in Mobile Networks was primarily due to lower gross margin and lower net sales. Ultra Broadband Networks gross margin in 2018 was 44.6%, compared to 47.3% in 2017.

Global Services gross profit in 2018 was EUR 1 001 million, a decrease of EUR 112 million, or 10%, compared to EUR 1 113 million in 2017. The decrease in Global Services gross profit was primarily due lower gross margin and lower net sales, partially offset by lower incentive accruals. Global Services gross margin in 2018 was 17.5%, compared to 19.2% in 2017.

IP Networks and Applications gross profit in 2018 was EUR 2 523 million, a decrease of EUR 50 million, or 2%, compared to EUR 2 573 million in 2017. The decrease in IP Networks and Applications gross profit was primarily due to IP/Optical Networks, partially offset by Nokia Software. The lower gross profit in IP/Optical Networks was primarily due to lower gross margin and lower net sales. The higher gross profit in Nokia Software was due to higher gross margin and higher net sales. IP Networks and Applications gross margin in 2018 was 44.1%, compared to 44.8% in 2016.

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Operating expenses

Nokia's Networks business research and development expenses were EUR 3 592 million in 2018, a decrease of EUR 138 million, or 4%, compared to EUR 3 730 million in 2017. The decrease in Nokia's Networks business research and development expenses was primarily due to Ultra Broadband Networks and IP Networks and Applications. Ultra Broadband Networks research and development expenses were EUR 2 273 million in 2018, a decrease of EUR 88 million, compared to EUR 2 361 million in 2017. The decrease in Ultra Broadband Networks research and development expenses was primarily due to Mobile Networks. The lower research and development expenses in Mobile Networks was primarily due to lower personnel expenses, reflecting progress related to our cost savings program, as well as lower incentive accruals. Global Services research and development expenses were EUR 87 million in 2018, an increase of EUR 2 million, compared to EUR 85 million in 2017. IP Networks and Applications research and development expenses were EUR 1 232 million in 2018, a decrease of EUR 52 million, compared to EUR 1 284 million in 2017. The decrease in IP Networks and Applications was due to both Nokia Software and IP/Optical Networks. The decrease in Nokia Software research and development expenses was primarily due to improved productivity, following the successful implementation of a common software foundation. The decrease in IP/Optical Networks research and development expenses was primarily due to net positive foreign exchange fluctuations. IP Networks and Applications research and development expenses also benefitted from lower incentive accruals in 2018.

Nokia's Networks business selling, general and administrative expenses were EUR 2 576 million in 2018, a decrease of EUR 11 million, or approximately flat, compared to EUR 2 587 million in 2017. The decrease in Nokia's Networks business selling, general and administrative expenses was due to Ultra Broadband Networks, partially offset by IP Networks and Applications and Global Services. Ultra Broadband Networks selling, general and administrative expenses were EUR 1 079 million in 2018, a decrease of EUR 83 million, compared to EUR 1 162 million in 2017. The decrease in Ultra Broadband Networks selling, general and administrative expenses was primarily due to Mobile Networks. The decrease in Mobile Networks selling, general and administrative expenses was primarily due to progress related to Nokia's cost savings program, partially offset by higher costs related to 5G customer trials. Ultra Broadband Networks selling, general and administrative expenses also benefitted from lower incentive accruals in 2018. Global Services selling, general and administrative expenses were EUR 652 million in 2018, an increase of EUR 21 million, compared to EUR 631 million in 2017. The increase in Global Services selling, general and administrative expenses was primarily due to higher costs related to 5G customer trials. IP Networks and Applications selling, general and administrative expenses were EUR 845 million in 2018, an increase of EUR 51 million, compared to EUR 794 million in 2017. The increase in IP Networks and Applications selling, general and administrative expenses was due to both IP/Optical Networks and Nokia Software. The higher selling, general and administrative expenses in IP/Optical Networks was primarily due to higher investments to drive future growth and higher returns. The higher selling, general and administrative expenses in Nokia Software was primarily due to investments to build a dedicated software sales force, with specialized go to market capabilities.

Nokia's Networks business other income and expenses was an expense of EUR 33 million in 2018, a change of EUR 128 million compared to an income of EUR 95 million in 2017. The net negative fluctuation in other income and expenses was due to Ultra Broadband Networks, Global Services and IP Networks and Applications. The net negative fluctuation in Ultra Broadband Networks other income and expenses was primarily related to foreign exchange hedging. The net negative fluctuation in Global Services other income and expenses was primarily related to foreign exchange hedging and higher loss allowances. The net negative fluctuation in IP Networks and Applications other income and expenses was primarily due to foreign exchange hedging and higher loss allowances.

Operating profit

Nokia's Networks business operating profit was EUR 1 199 million in 2018, a decrease of EUR 512 million compared to EUR 1 711 million in 2017. Nokia's Networks business operating margin in 2018 was 6.0% compared to 8.3% in 2017. The decrease in operating margin was attributable to decreases in Ultra Broadband Networks, Global Services and IP Networks and Applications operating margin. Ultra Broadband Networks operating margin decreased from 8.7% in 2017 to 5.9% in 2018. Global Services operating margin decreased from 7.1% in 2017 to 4.2% in 2018. IP Networks and Applications operating margin decreased from 9.0% in 2017 to 7.8% in 2018. The decreases in Ultra Broadband Networks, Global Services and IP Networks and Applications operating margins in 2018 were primarily due to lower gross profit and a net negative fluctuation in other income and expenses, partially offset by lower research and development expenses.

For the year ended December 31, 2017 compared to the year ended December 31, 2016

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2017		2016		Year -on- year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	20 523	100.0	21 830	100.0	(6)
Cost of sales	(12 590)	(61.3)	(13 370)	(61.2)	(6)
Gross profit	7 933	38.7	8 460	38.8	(6)
Research and development expenses	(3 730)	(18.2)	(3 777)	(17.3)	(1)
Selling, general and administrative expenses	(2 587)	(12.6)	(2 664)	(12.2)	(3)
Other income and expenses	95	0.5	(76)	(0.3)	-
Operating profit	1 711	8.3	1 943	8.9	(12)

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Segment information(1)

	Ultra Broadband Networks(2) 2017	Global Services 2017	IP Networks and Applications(3) 2017	Networks total 2017	Ultra Broadband Networks(2) 2016	Global Services 2016	IP Networks and Applications 2016
For the year ended							
December 31	EURm	EURm	EURm	EURm	EURm	EURm	EURm
Net sales	8 970	5 810	5 743	20 523	9 758	6 036	6 036
Cost of sales	(4 723)	(4 697)	(3 170)	(12 590)	(5 210)	(4 825)	(3 335)
Gross profit	4 247	1 113	2 573	7 933	4 548	1 211	2 701
Research and development expenses	(2 361)	(85)	(1 284)	(3 730)	(2 393)	(96)	(1 288)
Selling, general and administrative expenses	(1 162)	(631)	(794)	(2 587)	(1 212)	(679)	(773)
Other income and expenses	57	14	24	95	(21)	(30)	(25)
Operating profit	781	411	519	1 711	922	406	615

(1) Refer to Note 5, Segment information, of our consolidated financial statements included in this annual report on Form 20 F.

(2) Net sales include EUR 6 895 million (EUR 7 357 million in 2016) attributable to Mobile Networks and EUR 2 075 million (EUR 2 401 million in 2016) attributable to Fixed Networks.

(3) Net sales include EUR 2 694 million (EUR 2 941 million in 2016) attributable to IP Routing; EUR 1 499 million (EUR 1 564 million in 2016) attributable to Optical Networks; and EUR 1 550 million (EUR 1 531 million in 2016) attributable to Nokia Software.

The following table sets forth distribution of net sales by geographical area for the years indicated.

	2017	2016	Year on year change %
For the year ended December 31	EURm	EURm	
Asia-Pacific	4 197	4 237	(1)
Europe	4 442	4 884	(9)
Greater China	2 466	2 640	(7)
Latin America	1 245	1 446	(14)
Middle East & Africa	1 897	1 891	–
North America	6 276	6 732	(7)
Total	20 523	21 830	(6)

Net sales

Nokia's Networks business net sales in 2017 were EUR 20 523 million, a decrease of EUR 1 307 million, or 6%, compared to EUR 21 830 million in 2016. The decrease in Nokia's Networks business net sales was primarily due to Ultra Broadband Networks and, to a lesser extent, IP Networks and Applications and Global Services. Ultra Broadband Networks net sales were EUR 8 970 million in 2017, a decrease of EUR 788 million, or 8%, compared to EUR 9 758 million in 2016. Global Services net sales were EUR 5 810 million in 2017, a decrease of EUR 226 million, or 4%, compared to EUR 6 036 million in 2016. IP Networks and Applications net sales were EUR 5 743 million in 2017, a decrease of EUR 293 million, or 5%, compared to EUR 6 036 million in 2016.

The decrease in Ultra Broadband Networks net sales is comprised of a decrease in Mobile Networks net sales of EUR 462 million and a decrease in Fixed Networks net sales of EUR 326 million.

In 2017, Mobile Networks net sales were adversely affected by challenging market conditions. The decrease in Mobile Networks net sales was primarily due to radio networks and, to a lesser extent, converged core networks, partially offset by growth in advanced mobile networks solutions. From a growth perspective, small cells continued to deliver strong performance. Also, within radio networks, LTE net sales grew, despite weakness in the global LTE market

The net sales performance in Fixed Networks was in comparison to a particularly strong year 2016. The decrease in Fixed Networks net sales was primarily due to broadband access and services, and related to three specific customers.

The decrease in Global Services net sales in 2017 was primarily due to systems integration, care and managed services, partially offset by growth in network implementation. The decrease in systems integration was attributable to the winding down of a specific set of legacy Alcatel Lucent contracts.

The decrease in IP Networks and Applications net sales is comprised of decrease in IP/Optical Networks net sales of EUR 312 million, partly offset by an increase in Nokia Software net sales of EUR 19 million.

The decrease in IP/Optical Networks net sales was due to both IP routing and optical networks, primarily due to weakness in the communications service provider market in preparation for a new product portfolio launch in IP routing. In addition, IP routing net sales were adversely affected by lower resale of third party IP routers.

The increase in Nokia Software net sales was primarily due to growth in network management, services and emerging businesses, partially offset by service delivery platforms and operational support systems. The year-on-year performance of Nokia Software benefitted from the acquisition of Comptel. 2017 was a year of transformation for our software business. It announced and executed plans to: (1) build our first standalone software sales force, (2) strengthen its services and care practices, (3) increase research and development velocity through modern software development, including the introduction of a Common Software Foundation that will improve the user experience for Nokia Software software, (4) acquire and integrate Comptel and (5) introduce new products and services that provide customers with increased intelligence and ability to push automation to new levels.

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Gross profit

Nokia's Networks business gross profit in 2017 was EUR 7 933 million, a decrease of EUR 527 million, or 6%, compared to EUR 8 460 million in 2016. Nokia's Networks business gross margin in 2017 was 38.7%, compared to 38.8% in 2016. The decrease in Nokia's Networks business gross profit was primarily due to Ultra Broadband Networks and, to a lesser extent, IP Networks and Applications and Global Services.

Ultra Broadband Networks gross profit in 2017 was EUR 4 247 million, a decrease of EUR 301 million, or 7%, compared to EUR 4 548 million in 2016. The decrease in Ultra Broadband Networks gross profit was due to both Mobile Networks and Fixed Networks. The lower gross profit in both Mobile Networks and Fixed Networks was primarily due to lower net sales. Ultra Broadband Networks gross margin in 2017 was 47.3%, compared to 46.6% in 2016.

Global Services gross profit in 2017 was EUR 1 113 million, a decrease of EUR 98 million, or 8%, compared to EUR 1 211 million in 2016. The decrease in Global Services gross profit was primarily due to network implementation, care and network planning and optimization, partially offset by systems integration. Global Services gross profit was negatively affected by the absence of a benefit related to lower incentive accruals in 2016. Global Services gross margin in 2017 was 19.2%, compared to 20.1% in 2016.

IP Networks and Applications gross profit in 2017 was EUR 2 573 million, a decrease of EUR 128 million, or 5%, compared to EUR 2 701 million in 2016. The decrease in IP Networks and Applications gross profit was primarily due to IP/Optical Networks, partially offset by Nokia Software. The lower gross profit in IP/Optical Networks was primarily due to lower net sales. The higher gross profit in Nokia Software was due to higher net sales. IP Networks and Applications gross margin in 2017 was 44.8%, compared to 44.7% in 2016.

Operating expenses

Nokia's Networks business research and development expenses were EUR 3 730 million in 2017, a slight decrease of EUR 47 million, or 1%, compared to EUR 3 777 million in 2016. The decrease in Nokia's Networks business research and development expenses was primarily attributable to Ultra Broadband Networks research and development expenses, and to a lesser extent, Global Services research and development expenses. Ultra Broadband Networks research and development expenses were EUR 2 361 million in 2017, a decrease of EUR 32 million, compared to EUR 2 393 million in 2016. The decrease in Ultra Broadband Networks research and development expenses was primarily due to Mobile Networks, partially offset by Fixed Networks. The lower research and development expenses in Mobile Networks was primarily due to lower personnel expenses, reflecting progress related to our cost savings program, with reduced research and development related to legacy technologies, partially offset by an increase in research and development related to 5G. The higher research and development expenses in Fixed Networks was primarily related to investments to drive growth and higher returns in our current addressable market, as well as to expand into adjacent markets, both of which are priorities for Fixed Networks. Related to our current addressable market, Fixed Networks has increased its investments to enhance its portfolio of offerings towards the digital home and software defined access markets. Related to adjacent markets, Fixed Networks has increased its investments towards the cable access market, and is now offering a disruptive cable solution which gives operators the flexibility to choose from a full range of options across both fiber and cable to meet their unique network needs. Ultra Broadband Networks research and development expenses were negatively affected by the absence of a benefit related to lower incentive accruals for full year 2016. Global Services research and development expenses were EUR 85 million in 2017, a decrease of EUR 11 million, compared to EUR 96 million in 2016. The decrease in Global Services research and development expenses was primarily due to lower personnel expenses, reflecting progress related to our cost savings program. IP Networks and Applications research and development expenses were EUR 1 284 million in 2017, a decrease of EUR 4 million, compared to EUR 1 288 million in 2016.

Nokia's Networks business selling, general and administrative expenses were EUR 2 587 million in 2017, a decrease of EUR 77 million, or 3%, compared to EUR 2 664 million in 2016. The decrease in Nokia's Networks business selling, general and administrative expenses was attributable to decreases in both Ultra Broadband Networks and Global Services selling, general and administrative expenses, partially offset by an increase in IP Networks and Applications selling, general and administrative expenses.

Ultra Broadband Networks selling, general and administrative expenses were EUR 1 162 million in 2017, a decrease of EUR 50 million, compared to EUR 1 212 million in 2016. The decrease in Ultra Broadband Networks selling, general and administrative expenses was primarily due to Mobile Networks. The lower selling, general and administrative expenses in Mobile Networks was primarily due to lower personnel expenses reflecting progress related to our cost savings program and lower consultancy costs. Ultra Broadband Networks selling, general and administrative expenses were negatively affected by the absence of a benefit related to lower incentive accruals for full year 2016. Global Services selling, general and administrative expenses were EUR 631 million in 2017, a decrease of EUR 48 million, compared to EUR 679 million in 2016. The decrease in Global Services selling, general and administrative expenses was primarily due to lower personnel expenses, reflecting progress related to our cost savings program. IP Networks and Applications selling, general and administrative expenses were EUR 794 million in 2017, an increase of EUR 21 million, compared to EUR 773 million in 2016. The increase in IP Networks and Applications selling, general and administrative expenses was primarily due to Nokia Software. The higher selling, general and administrative expenses in Nokia Software was primarily due to investments to build an independent, dedicated software sales organization.

Nokia's Networks business other income and expenses was an income of EUR 95 million in 2017, a change of EUR 171 million compared to an expense of EUR 76 million in 2016. The change in other income and expenses was attributable to Ultra Broadband Networks, IP Networks and Applications and Global services other income and expenses. The net positive fluctuation in Ultra Broadband Networks other income and expenses was primarily related to foreign exchange hedging. The net positive fluctuation in Global Services other income and expenses was primarily related to foreign exchange hedging and lower loss allowances. The net positive fluctuation in IP Networks and Applications other income and expenses was primarily due to lower loss allowances and a settlement with a component supplier.

Operating profit

Nokia's Networks business operating profit was EUR 1 711 million in 2017, a decrease of EUR 232 million compared to EUR 1 943 million in 2016. Nokia's Networks business operating margin in 2017 was 8.3% compared to 8.9% in 2016. The decrease in operating margin was attributable to decreases in both Ultra Broadband Networks and IP Networks and Applications operating margin, partly offset by a slight increase in Global Services operating margin. Ultra Broadband Networks operating margin decreased from 9.4% in 2016 to 8.7% in 2017. IP Networks and

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Applications operating margin decreased from 10.2% in 2016 to 9.0% in 2017. The decreases in both Ultra Broadband Networks and IP Networks and Applications operating margins in 2017 were primarily attributable to lower gross profit.

Nokia Technologies

For the year ended December 31, 2018 compared to the year ended December 31, 2017

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2018		2017		Year on year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	1 501	100.0	1 654	100.0	(9)
Cost of sales	(22)	(1.5)	(71)	(4.3)	(69)
Gross profit	1 479	98.5	1 583	95.7	(7)
Research and development expenses	(145)	(9.7)	(235)	(14.2)	(38)
Selling, general and administrative expenses	(127)	(8.5)	(218)	(13.2)	(42)
Other income and expenses	(4)	(0.3)	(6)	(0.4)	–
Operating profit	1 203	80.1	1 124	68.0	7

Net sales

Nokia Technologies net sales in 2018 were EUR 1 501 million, a decrease of EUR 153 million, or 9%, compared to EUR 1 654 million in 2017. In 2018, EUR 1 476 million of net sales related to patent and brand licensing and EUR 25 million of net sales related to digital health and digital media. In 2017, EUR 1 602 million of net sales related to patent and brand licensing and EUR 52 million of net sales related to digital health and digital media. The decrease in Nokia Technologies net sales was primarily due to lower one-time net sales, partially offset by higher recurring licensing net sales.

Gross profit

Nokia Technologies gross profit in 2018 was EUR 1 479 million, a decrease of EUR 104 million, or 7%, compared to EUR 1 583 million in 2017. The lower gross profit in Nokia Technologies was primarily due to lower net sales, partially offset by higher gross margin, reflecting the discontinuation of our digital media product business and the absence of costs related to digital health, following the sale of our digital health business in 2018.

Operating expenses

Nokia Technologies research and development expenses in 2018 were EUR 145 million, a decrease of EUR 90 million, or 38%, compared to EUR 235 million in 2017. The decrease in Nokia Technologies research and development expenses was primarily due to reduced investments in digital media and the absence of costs related to digital health, following the sale of our digital health business in 2018, as well as lower patent portfolio costs.

Nokia Technologies selling, general and administrative expenses in 2018 were EUR 127 million, a decrease of EUR 91 million, or 42%, compared to EUR 218 million in 2017. The decrease in Nokia Technologies selling, general and administrative expenses was primarily due to lower licensing-related litigation costs and lower costs due to the

discontinuation of our digital media and digital health businesses.

Nokia Technologies other income and expense in 2018 was a net expense of EUR 4 million, a change of EUR 2 million compared to a net expense of EUR 6 million in 2017.

Operating profit

Nokia Technologies operating profit in 2018 was EUR 1 203 million, an increase of EUR 79 million, or 7%, compared to an operating profit of EUR 1 124 million in 2017. The increase in Nokia Technologies operating profit was primarily due to lower selling, general and administrative and research and development expenses, partially offset by lower gross profit. Nokia Technologies operating margin in 2018 was 80.1% compared to 68.0% in 2017.

For the year ended December 31, 2017 compared to the year ended December 31, 2016

The following table sets forth selective line items and the percentage of net sales for the years indicated.

For the year ended December 31	2017		2016		Year on year change %
	EURm	% of net sales	EURm	% of net sales	
Net sales	1 654	100.0	1 053	100.0	57
Cost of sales	(71)	(4.3)	(42)	(4.0)	69
Gross profit	1 583	95.7	1 011	96.0	57
Research and development expenses	(235)	(14.2)	(249)	(23.6)	(6)
Selling, general and administrative expenses	(218)	(13.2)	(184)	(17.5)	18
Other income and expenses	(6)	(0.4)	1	0.1	–
Operating profit	1 124	68.0	579	55.0	94

Net sales

Nokia Technologies net sales in 2017 were EUR 1 654 million, an increase of EUR 601 million, or 57%, compared to EUR 1 053 million in 2016. In 2017, EUR 1 602 million of net sales related to patent and brand licensing and EUR 52 million of net sales related to digital health and digital media. The increase in Nokia Technologies net sales was primarily due to recurring net sales related to new license agreements and settled arbitrations, non-recurring net sales related to settled arbitrations and new license agreements and, to a lesser extent, our brand partnership with

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HMD Global. This was partially offset by lower licensing income from certain existing licensees. In 2017, Nokia Technologies net sales included approximately EUR 300 million of non-recurring catch-up net sales related to prior years, compared to approximately zero in 2016.

Gross profit

Nokia Technologies gross profit in 2017 was EUR 1 583 million, an increase of EUR 572 million, or 57%, compared to EUR 1 011 million in 2016. The higher gross profit in Nokia Technologies was primarily due to higher net sales.

Operating expenses

Nokia Technologies research and development expenses in 2017 were EUR 235 million, a decrease of EUR 14 million, or 6%, compared to EUR 249 million in 2016. The decrease in Nokia Technologies research and development expenses was primarily due to lower patent portfolio costs.

Nokia Technologies selling, general and administrative expenses in 2017 were EUR 218 million, an increase of EUR 34 million, or 18%, compared to EUR 184 million in 2016. The increase in Nokia Technologies selling, general and administrative expenses was primarily due to a non-recurring licensing cost and the ramp-up of digital health. This was partially offset by lower licensing-related litigation costs, which benefitted from a reimbursement related to a settled arbitration, as well as lower business support costs. The higher selling, general and administrative expenses in digital health were primarily due to the acquisition of Withings in 2016.

Nokia Technologies other income and expense in 2017 was a net expense of EUR 6 million, a change of EUR 7 million compared to a net income of EUR 1 million in 2016.

Operating profit

Nokia Technologies operating profit in 2017 was EUR 1 124 million, an increase of EUR 545 million, or 94%, compared to an operating profit of EUR 579 million in 2016. The increase in Nokia Technologies operating profit was primarily attributable to higher gross profit. Nokia Technologies operating margin in 2017 was 68.0% compared to 55.0% in 2016.

Group Common and Other

For the year ended December 31, 2018 compared to the year ended December 31, 2017

The following table sets forth selective line items for the years indicated.

	2018	2017
For the year ended December 31	EURm	EURm
Net sales	1 021	1 114
Cost of sales	(865)	(956)
Gross profit	156	158
Research and development expenses	(277)	(260)
Selling, general and administrative expenses	(193)	(219)
Other income and expenses	92	73
Operating loss	(222)	(248)

Net sales

Group Common and Other net sales in 2018 were EUR 1 021 million, a decrease of EUR 93 million, or 8%, compared to EUR 1 114 million in 2017. The decrease in Group Common and Other net sales was primarily due to Alcatel Submarine Networks, partially offset by Radio Frequency Systems.

Gross profit

Group Common and Other gross profit in 2018 was EUR 156 million, a decrease of EUR 2 million, or 1%, compared to EUR 158 million in 2017. The lower gross profit was primarily due to Alcatel Submarine Networks, partially offset by Radio Frequency Systems. Group Common and Other gross margin in 2018 was 15.3% compared to 14.2% in 2017.

Operating expenses

Group Common and Other research and development expenses in 2018 were EUR 277 million, an increase of EUR 17 million, or 7%, compared to EUR 260 million in 2017. The increase in Group Common and Other research and development expenses was primarily due to higher costs related to Nokia Bell Labs.

Group Common and Other selling, general and administrative expenses in 2018 were EUR 193 million, a decrease of EUR 26 million, or 12%, compared to EUR 219 million in 2017. The decrease in Group Common and Other selling, general and administrative expenses was primarily due to lower support function costs, reflecting progress related to our cost savings program.

Group Common and Other other income and expense in 2018 was a net income of EUR 92 million, a change of EUR 20 million compared to a net income of EUR 73 million in 2017. The net positive fluctuation in other income and expenses was primarily due to higher gains in venture fund investments, partially offset by the absence of the unwinding of a reinsurance contract and an expiration of a former Alcatel Lucent stock option liability, both of which benefitted 2017.

Operating loss

Group Common and Other operating loss in 2018 was EUR 222 million, a decrease of EUR 26 million, compared to an operating loss of EUR 248 million in 2017. The change in Group Common and Other operating loss was primarily attributable to a positive fluctuation in other income and expense, and lower selling, general and administrative expenses, partly offset by higher research and development expenses.

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For the year ended December 31, 2017 compared to the year ended December 31, 2016

The following table sets forth selective line items for the years indicated.

	2017	2016
For the year ended December 31	EURm	EURm
Net sales	1 114	1 142
Cost of sales	(956)	(957)
Gross profit	158	185
Research and development expenses	(260)	(287)
Selling, general and administrative expenses	(219)	(235)
Other income and expenses	73	(13)
Operating loss	(248)	(350)

Net sales

Group Common and Other net sales in 2017 were EUR 1 114 million, a decrease of EUR 28 million, or 2%, compared to EUR 1 142 million in 2016. The decrease in Group Common and Other net sales was primarily due to Alcatel Submarine Networks, partially offset by Radio Frequency Systems.

Gross profit

Group Common and Other gross profit in 2017 was EUR 158 million, a decrease of EUR 27 million, or 15%, compared to EUR 185 million in 2016. The lower gross profit was primarily due to Alcatel Submarine Networks. Group Common and Other gross margin in 2017 was 14.2% compared to 16.2% in 2016.

Operating expenses

Group Common and Other research and development expenses in 2017 were EUR 260 million, a decrease of EUR 27 million, or 9%, compared to EUR 287 million in 2016. The decrease in Group Common and Other research and development expenses was primarily due to lower personnel expenses, reflecting progress related to our cost savings program.

Group Common and Other selling, general and administrative expenses in 2017 were EUR 219 million, a decrease of EUR 16 million, or 7%, compared to EUR 235 million in 2016. The decrease in Group Common and Other selling, general and administrative expenses was primarily due to lower personnel expenses, reflecting progress related to our cost savings program.

Group Common and Other other income and expense in 2017 was a net income of EUR 73 million, a change of EUR 86 million compared to a net expense of EUR 13 million in 2016. The net positive fluctuation in other income and expenses was primarily due to the unwinding of a reinsurance contract, gains in venture fund investments and an expiration of a former Alcatel Lucent stock option liability.

Operating loss

Group Common and Other operating loss in 2017 was EUR 248 million, a decrease of EUR 102 million, compared to an operating loss of EUR 350 million in 2016. The change in Group Common and Other operating loss was primarily

attributable to a positive fluctuation in other income and expense, and to a lesser extent, lower R&D and selling, general and administrative expenses, partly offset by lower gross profit.

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Liquidity and capital resources

Financial position

As of December 31, 2018, our total cash and current financial investments (defined as cash and cash equivalents and current financial investments) equaled EUR 6 873 million, a decrease of EUR 1 407 million, compared to EUR 8 280 million as of December 31, 2017. The decrease was primarily attributable to payment of dividends of EUR 1 081 million; EUR 943 million cash tied-up as net working capital and capital expenditures of EUR 672 million. As of December 31, 2016, our total cash and current financial investments equaled EUR 9 326 million.

As of December 31, 2018, our net cash and current financial investments (defined as total cash and current financial investments less long-term and short-term interest-bearing liabilities) equaled EUR 3 051 million, a decrease of EUR 1 463 million, compared to EUR 4 514 million as of December 31, 2017. The decrease was mainly attributable to drivers affecting our total cash and current financial investments as described above. As of December 31, 2016, our net cash and current financial investments equaled EUR 5 299 million.

As of December 31, 2018, our cash and cash equivalents equaled EUR 6 261 million, a decrease of EUR 1 108 million compared to EUR 7 369 million as of December 31, 2017. As of December 31, 2016, our cash and cash equivalents equaled EUR 7 497 million.

Cash flow

2018

Our cash inflow from operating activities in 2018 was EUR 360 million a decrease of EUR 1 451 million compared to a cash inflow of EUR 1 811 million in 2017. The decrease was primarily attributable to EUR 943 million cash tied-up to net working capital in 2018 compared to EUR 504 million cash release in 2017 and net profit, adjusted for non-cash items, of EUR 1 758 million, a decrease of EUR 460 million compared to EUR 2 218 million in 2017. The primary driver for the increase in net working capital was related to a decrease in liabilities of EUR 645 million compared to an increase of EUR 1 221 million in 2017, and an increase in inventories of EUR 544 million compared to an increase of EUR 296 million in 2017. The decrease in liabilities was primarily attributable to a restructuring and associated cash outflows, decrease in deferred revenue and the payment of employee incentives related to Nokia's business performance in 2017, partially offset by an increase in trade payables. The increase in inventories was attributable to a decision to ensure sufficient flexibility to deliver higher levels of equipment sales, particularly related to 5G. The decrease in liabilities and the increase in inventories were partially offset by a decrease in receivables of EUR 246 million.

Cash flow from operating activities included interest paid of EUR 159 million, a decrease of EUR 250 million compared to EUR 409 million in 2017; paid taxes of EUR 364 million, a decrease of EUR 191 million compared to EUR 555 million in 2017; and interest received of EUR 68 million, an increase of EUR 15 million compared to EUR 53 million in 2017. In 2018, out of EUR 364 million paid taxes, approximately EUR 100 million were non-recurring in nature and related to the resolution of a tax dispute in India. In 2018, out of EUR 159 million interest paid, approximately EUR 40 million were non-recurring in nature and primarily related to the disposal of the former Alcatel Lucent railway signaling business to Thalés in 2006.

In 2018, our cash outflow from investing activities equaled EUR 315 million, a decrease of EUR 325 million compared to EUR 10 million cash inflow in 2017. Cash outflow from investing activities was primarily driven by cash outflow due to the capital expenditure of EUR 672 million partially offset by net cash inflow of EUR 293 million resulting from proceeds from maturities and sale of current financial investments of EUR 2 397 million and purchase

of current financial investments of EUR 2 104 million.

Major items of capital expenditure in 2018 included investments in R&D equipment, test equipment, hardware for telecommunication and cloud environment, plants, buildings and construction for transformation projects, and repair or improvements of sites.

In 2018, our cash outflow from financing activities was EUR 969 million a decrease of EUR 780 million in comparison to EUR 1 749 million cash outflow in 2017. The decrease in cash outflows was primarily due to the absence of repurchases of shares related to the two-year capital structure optimization program completed in 2017. The decrease in cash outflow was partially offset by paid dividends of EUR 1 081 million compared to EUR 970 million in 2017.

2017

Our cash inflow from operating activities in 2017 was EUR 1 811 million an increase of EUR 3 265 million compared to a cash outflow of EUR 1 454 million in 2016. The increase was primarily attributable to EUR 504 million cash release from net working capital in 2017 compared to EUR 2 187 million cash being tied-up in 2016; and net profit, adjusted for non-cash items, of EUR 2 218 million, an increase of EUR 758 million compared to EUR 1 460 million in 2016. The primary driver for the decrease in net working capital was related to an increase in liabilities of EUR 1 221 million compared to a decrease of EUR 2 738 million in 2016. The increase in liabilities was primarily attributable to an up-front cash payment of approximately EUR 1 700 million, part of which has been recognized as net sales in 2017, and an increase in trade payables partially offset by restructuring and associated cash outflows of approximately EUR 550 million. The increase in liabilities was partially offset by an increase in receivables of EUR 421 million and an increase in inventories of EUR 296 million.

Cash flow from operating activities included interest paid of EUR 409 million, an increase of EUR 100 million compared to EUR 309 million in 2016; paid taxes of EUR 555 million, an increase of EUR 52 million compared to EUR 503 million in 2016; and interest received of EUR 53 million, a decrease of EUR 32 million compared to EUR 85 million in 2016. In 2017, out of EUR 555 million paid taxes, approximately EUR 260 million were non-recurring in nature and related to the disposal of the former Alcatel Lucent railway signaling business to Thalés in 2006 and the integration of the former Alcatel Lucent and Nokia operating models. In 2017, out of EUR 409 million interest paid, EUR 250 million were non-recurring in nature and related primarily to our offer to purchase selected outstanding notes.

In 2017, our cash inflow from investing activities equaled EUR 10 million, a decrease of EUR 6 826 million compared to EUR 6 836 million cash inflow in 2016. The decrease in cash inflow from investing activities was primarily driven by cash outflow due to the acquisition of businesses of EUR 394 million, mainly related to the acquisition of Comptel, compared to EUR 5 819 million cash inflow in 2016, which included cash and cash equivalents acquired as part of the acquisition of Alcatel Lucent. In 2017, cash outflow from acquisition of businesses was partially offset by net cash inflow of EUR 860 million resulting from proceeds from maturities and sale of current financial investments of EUR 3 589 million and purchase of current financial investments of EUR 2 729 million.

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In 2017, our capital expenditure equaled EUR 601 million, an increase of EUR 124 million compared to EUR 477 million in 2016. Major items of capital expenditure in 2017 included investments in R&D equipment, test equipment, hardware for telco and cloud environment, plants, buildings and construction for transformation projects, and repair or improvements of sites.

In 2017, our cash outflow from financing activities was EUR 1 749 million a decrease of EUR 3 174 million in comparison to EUR 4 923 million cash outflow in 2016. The decrease in cash outflows was primarily driven by proceeds from long-term borrowings of EUR 2 129 million, an increase of EUR 1 904 million compared to 2016, mainly related to issued new bonds; repayment of long-term borrowings of EUR 2 044 million, a decrease of EUR 555 million compared to 2016; and paid dividends of EUR 970 million, a decrease of EUR 545 million compared to 2016. The decrease in cash outflow was partially offset by purchase of treasury shares of EUR 785 million representing an increase of EUR 569 million compared to 2016.

Financial assets and debt

As of December 31, 2018, our net cash and current financial investments equaled EUR 3 051 million consisting of EUR 6 873 million in total cash and current financial investments, and EUR 3 822 million of long-term and short-term interest-bearing liabilities.

We hold our cash and current financial investments predominantly in euro. Our current financial investments mainly include high-quality money-market and fixed income instruments with strict maturity limits. We also have a EUR 1 579 million undrawn revolving credit facility available for liquidity purposes. The facility has no financial covenants and was undrawn on December 31, 2018.

As of December 31, 2018, our interest-bearing liabilities consisted of EUR 231 million notes due in 2019, USD 581 million notes due in 2019, EUR 500 million notes due 2021, USD 500 million notes due 2022, EUR 750 million notes due 2024, USD 500 million notes due 2027, USD 74 million notes due in 2028, USD 206 million notes due in 2029, USD 500 million notes due in 2039 and EUR 294 million of other liabilities. The notes maturing in 2019, 2021, 2022, 2024, 2027 and 2039 are issued by Nokia Corporation, while the notes maturing in 2028 and 2029 are issued by Lucent Technologies Inc., a predecessor to Nokia of America Corporation (Nokia's wholly-owned subsidiary, formerly known as Alcatel-Lucent USA Inc.). Refer to Note 23, Interest-bearing liabilities, of our consolidated financial statements included in this annual report on Form 20-F for further information regarding our interest-bearing liabilities.

In August 2018, we signed a loan facility agreement of EUR 500 million for financing research and development of 5G technology with the European Investment Bank (EIB). The availability period of the loan facility ends in February 2020. The loan facility was not disbursed as of December 31, 2018 and will have an average maturity of approximately five years after disbursement.

In December 2018, we signed a loan facility agreement of EUR 250 million for financing research and development of 5G technology with the Nordic Investment Bank (NIB). The initial availability period of the loan facility ended in February 2019. Subsequently in February 2019, the availability period of the loan facility was extended until August 2019. The loan facility was not disbursed as of December 31, 2018 and will have an average maturity of approximately five years after disbursement.

We consider that with EUR 6 873 million of cash and current financial investments as well as our EUR 1 579 million revolving credit facility, we have sufficient funds to satisfy our future working capital needs, capital expenditures, R&D investments, structured finance, venture fund commitments, acquisitions and debt service requirements, at least through 2019. We further consider that with our current credit ratings of BB+ by Standard & Poor's and Ba1 by

Moody's, we have access to the capital markets should any funding needs arise in 2019.

We aim to re-establish our investment grade credit rating.

Off-balance sheet arrangements

There are no material off-balance sheet arrangements that have, or are reasonably likely to have, a current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources that are material to investors, except for the purchase obligations and leasing commitments, as well as guarantees and financing commitments disclosed in Note 30, Commitments and contingencies, of our consolidated financial statements included in this annual report on Form 20-F.

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Structured finance

Structured finance includes customer financing and other third-party financing. Network operators occasionally require their suppliers, including us, to arrange, facilitate or provide long-term financing as a condition for obtaining infrastructure projects.

As of December 31, 2018, our total customer financing, outstanding and committed, equaled EUR 499 million, a decrease of EUR 156 million as compared to EUR 655 million in 2017. As of December 31, 2016, our total customer financing, outstanding and committed, equaled EUR 352 million. Customer financing primarily consisted of financing commitments to network operators.

Refer to Note 36, Financial risk management, of our consolidated financial statements included in this annual report on Form 20-F for further information relating to our committed and outstanding customer financing.

We expect our customer financing commitments to be financed mainly from cash and current financial investments and through cash flow from operations.

As of December 31, 2018, guarantees of our performance consisted of bank guarantees given on behalf of Nokia to its customers for EUR 1 570 million (EUR 1 678 million as of December 31, 2017). In addition, Nokia issued corporate guarantees directly to our customers with primary obligation for EUR 1 041 million (EUR 1 114 million as of December 31, 2017). These instruments entitle our customers to claim payments as compensation for non-performance by Nokia of its obligations under supply agreements. Depending on the nature of the instrument, compensation is either payable on demand, or is subject to verification of non-performance.

Financial guarantees and any collateral pledged that we may give on behalf of customers, represent guarantees relating to payment by certain customers and other third parties under specified loan facilities between such customers or other third parties and their creditors. Our obligations under such guarantees are released upon the earlier of expiration of the guarantee or early payment by the customer or other third party.

Refer to Note 30, Commitments and contingencies, of our consolidated financial statements included in this annual report on Form 20-F for further information regarding commitments and contingencies.

Venture fund investments and commitments

We make financing commitments to a number of unlisted venture funds that make technology-related investments. The majority of the investments are managed by Nokia Growth Partners which specializes in growth-stage investing, seeking companies that are changing the face of mobility and connectivity.

As of December 31, 2018, our unlisted venture fund investments equaled EUR 682 million, compared to EUR 661 million as of December 31, 2017. Refer to Note 24, Fair value of financial instruments, of our consolidated financial statements included in this annual report on Form 20-F for further information regarding fair value of our unlisted venture fund investments.

As of December 31, 2018, our venture fund commitments equaled EUR 314 million, compared to EUR 396 million as of December 31, 2017. As a limited partner in venture funds, we are committed to capital contributions and entitled to cash distributions according to the respective partnership agreements and underlying fund activities. Refer to Note 30, Commitments and contingencies, of our consolidated financial statements included in this annual report on Form 20-F for further information regarding commitments and contingencies.

Treasury policy

Treasury activities are governed by the Nokia Treasury Policy approved by the President and CEO and supplemented by operating procedures approved by the CFO, covering specific areas such as foreign exchange risk, interest rate risk, credit risk and liquidity risk. The objective of treasury's liquidity and capital structure management activities is to ensure that we have sufficient liquidity to go through unfavorable periods without being severely constrained by the availability of funds to execute Nokia's business plans and implement Nokia's long-term business strategy. We are risk-averse in our treasury activities.

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Significant subsequent events

Changes in organizational structure

Nokia announced organizational changes to accelerate its strategy execution on October 25, November 22 and December 31, 2018. Starting January 1, 2019, Nokia revised its financial reporting structure to better reflect its strategy, organizational structure and the way it evaluates operational performance and allocates resources. As of the first quarter 2019, Nokia will have three reportable segments: (i) Networks, (ii) Nokia Software and (iii) Nokia Technologies. In addition, Nokia will disclose segment-level data for Group Common and Other. For each reportable segment, Nokia will provide detailed financial disclosure, including net sales and operating profit.

In addition, Nokia will provide net sales disclosure for the following businesses: (i) Mobile Access, (ii) Fixed Access, (iii) IP Routing and (iv) Optical Networks, which together comprise the new Networks reportable segment. Nokia will also provide separate net sales disclosure for its different customer types: (i) Communication Service Providers, (ii) Enterprises and (iii) Licensees. Net sales by region will be provided at the Group level.

Financing transactions

On February 4, 2019, Nokia repaid EUR 231 million 6.75% Senior Notes in cash at the maturity.

On February 14, 2019, the availability period of EUR 250 million loan facility with the Nordic Investment Bank (NIB) was extended until August 2019.

On March 11, 2019, Nokia issued a tranche of senior unsecured notes in an aggregate principal amount of EUR 750 million. The notes will mature on March 11, 2026, and have a 2.00% fixed coupon.

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Sustainability and corporate responsibility

We create the technology to connect the world in a responsible way.

We truly believe the positive impact of the technology and solutions we create and deliver, our daily work, far outweigh any negative impacts. Communications technologies provide access to better healthcare and education, more efficient industry and resource use, economic opportunity, a more equitable, secure society, and a cleaner, safer planet. Every day we can change the world for the better.

We continue to work to enable a more socially, ethically and environmentally responsible world. We purposefully design technologies to drive social, environmental, and economic progress, and wherever we can, seek to harness the opportunities of connectivity and technology for people and our planet. We continue to put in place and further develop the processes, policies and programs that align with globally recognized ethical and responsible business practices and frameworks. We understand and aim to mitigate the potential risks and impact associated with our business across technology, supply chain, climate and people, while also driving the opportunities within and beyond our business to accelerate the achievement of the UN Sustainable Development Goals (SDGs).

Our greatest impact in accelerating realization of the SDGs remains in the development and delivery of our technology. With the advent of such technologies as 5G, IoT, and AI, individuals and communities will be more economically and socially empowered. Through technology we are already seeing the initial efficiency promised by the fourth industrial revolution: smart cities that are more efficient, safer, cleaner and more secure; increased access to digital health; and better management of natural resources through digitalized utilities, building towards a purpose-driven economic model. As we move into a new era of technology, we also recognize and aim to mitigate potential risks, many already hotly debated in society as a whole. The social issues related to technology include automation and the changing landscape of jobs and talent acquisition, the role of AI and big data in privacy, the enhanced security of smart cities, the misuse of technology, and the impact of smart devices on society.

Security will be one of the cornerstones of new technologies. Even today, although we endeavor to develop products and services that meet the appropriate security standards, including effective data protection, we or our products may be subject to cybersecurity breaches, including hacking, viruses, worms and other malicious software, unauthorized modifications, or illegal activities that may cause potential security risks and other harm to us, our customers or consumers, and other end-users of our products and services. IT is rapidly evolving, techniques used to obtain unauthorized access or sabotage systems change frequently and the parties behind cyber attacks and other industrial espionage are believed to be sophisticated and have extensive resources. Fourth industrial revolution will no doubt accelerate this development as well. We continue to invest in risk mitigation actions, such as security culture and customer security requirement programs, IT security and cybersecurity operations, product and services security, breach management process and third party security management, in order to reduce the risks related to such illegal activity.

As regards privacy, we have established a comprehensive company-wide privacy program that is based on relevant laws, best practices, and standards. This program is supported by, and aligned with corporate, business-group, and central functions-level policies and processes. Our objective is to mitigate privacy risk in relation to the data we collect, process, and store. Essential to this approach is observing the concept of data minimization, meaning we endeavor only to collect personal data that is necessary for the purpose for which they are collected and to retain such data for no longer than necessary. We then implement appropriate controls to ensure that all personal data is only accessed by persons with a clear and justifiable need to know. Should a personal data breach occur, we have a formal process in place to manage and mitigate any related risk to data subjects. These processes also include mechanisms to communicate with supervisory authorities, should that be required. To drive and maintain privacy awareness, we have

designed and delivered a program of awareness training targeting high-risk groups as well as all Nokia colleagues through a mandatory e-learning module. Employee responsibilities towards privacy are also covered in our Code of Conduct.

Other potential risks to our business and reputation are also evident. Corruption, unethical behavior, and a lack of respect for human rights and fair labor conditions in operations and supply chains remain growing concerns in many countries, resulting in the need for greater transparency and integrity from companies, going beyond the increasing regulatory sphere. However, we also believe the technology we provide can help other organizations increase transparency and efficiency. Climate change and the depletion of natural resources perhaps provide the most pressing social and business risk of our time. The potential effects of climate change are wide ranging, from the natural disasters that could affect our customers, our own operations, supply chain and the world economy, to rising energy prices, greater regulation, and materials scarcity affecting production. But we also see the opportunity for the technology we develop to help others drive down their negative impact on the environment with energy efficient products, best use of materials, greater automation, and the digitalization of industries and society.

We have implemented a systematic and structured approach to risk management across our business operations and processes. Key risks and opportunities are primarily identified against business targets, either in business operations or as an integral part of financial planning. These key risks and opportunities are analyzed, managed, monitored and identified as part of overall business performance management. Risk management covers strategic, operational, financial, and hazard risks and the aim is to systematically capitalize on, control, and manage rather than solely eliminate risks.

Potential external global environmental, social, and ethical risks are discussed in more detail under the relevant topic areas below.

Our sustainability priorities

In 2018, we continued to focus our corporate responsibility activities on the most material topics in relation to our business and the impact on sustainable development. Our key sustainability priorities are: to improve people's lives with technology, to protect the environment, to conduct our business with integrity, and to respect our people. Sustainability and corporate responsibility issues are reviewed regularly at all levels within Nokia, including review and feedback from the Board of Directors and Group Leadership Team.

Our material topics are based on factors which include our strategy and vision, risks and opportunities, feedback from stakeholder interaction, customer requirements, both macro and market trends, international sustainability frameworks, and the SDGs. In 2018, we further embedded the

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SDGs into our business and corporate responsibility approach and activities, and report activity examples against all 17 SDGs not only the most material ones for our business, as we believe the technology we provide can play a positive role in the achievement of all 17 SDGs.

For example, in June 2018, our President and CEO joined other CEOs across 11 major Nordic companies in engaging with the governments of the Nordic countries to explore ways to accelerate achievement of the SDGs across the region through collaboration between industries and civil society. Further in November, we were also acknowledged by the independent annual sustainability report review, commissioned by FIBS, Finland’s leading non-profit corporate responsibility network for our reporting on the SDGs in our 2017 People & Planet Report.

Overall in 2018 we focused on connectivity, its positive impact on people’s lives, and the creation and delivery of more sustainable and energy efficient products and services, circular economy, and climate change challenges. We further improved the robustness of our ethical business practices through an ombuds network, and supported initiatives and activities around data privacy, modern slavery, and freedom of expression, supply chain responsibility and transparency, health & safety, and employee engagement and diversity. Our latest People & Planet Report can be found at www.nokia.com/people&planet.

Targets and performance

In May 2018, we reported on our achievements and current status of the 46 short and long-term targets we had set in 2017, including our science-based climate targets (SBTs) accepted in 2017. The table below is a short snapshot of some of our targets which can all be found online at www.nokia.com/sustainability.

Our key targets, and performance

Targets	Achievements 2018	Status
2022 Helping our customers to connect the next billion measured by number of subscriptions in Nokia radio customers’ networks and by number of fixed network lines shipped to our customers.	At the end of 2018 the radio networks we delivered to our customers served around 6.1 billion subscriptions worldwide, compared to around 5.5 billion at the end of 2016.	On-going – on-track
2025 Improve the life of 2 000 000 persons through our corporate and key regional community investment programs (cumulative from 2016 baseline) focusing our action on gender balance, education and health and on how Nokia products and services improve people’s lives.	In 2018, our corporate and key regional community investment programs had around 304 200 direct beneficiaries. Since 2016, already around 1 426 600 people have benefitted from our programs.	On-going – on-track
2030 GHG reduction of 75%, compared to the 2014 baseline (scope 3, use of sold products). (This target is accepted by Science Based Target initiative)	Scope 3 emissions included in SBT are on target.	On-going – on-track
2030 GHG emission reduction of 41%, compared to the 2014 baseline (Scopes 1&2). (This target is accepted by Science Based Target initiative)	Scope 1&2 emissions included in SBT are on target.	On-going – on-track
2018 Achieve at least 25% utilization of renewable electricity, compared to total purchased electricity.	27% of our total purchased electricity was from renewable sources.	Achieved
2020 180 suppliers setting emission reduction targets.	In 2018, 187 of our suppliers had emission reduction targets in place via CDP Supply Chain program.	Achieved

2018 Ethical Business training (EBT) completion: 95%.	In 2018, the training was completed by 95 % of employees.	Achieved
2018 Conduct a formal Human Rights Impact Assessment for the new Nokia product portfolio with an externally verified expert.	Human Rights Impact Assessment for the Nokia product portfolio was conducted with an externally verified expert between July 2018 and March 2019.	Achieved
2020 Comprehensive supplier sustainability risk mitigation (90% of Suppliers assessed with Satisfactory Sustainability Score and 100 on-site audits conducted per year).	74% suppliers achieved a satisfactory EcoVadis score (71% in 2017) and we conducted 75 audits (72 in 2017).	On-going – not on-track
2018 Achieve full traceability to the smelters in our supply chain and their conflict-free status (Mobile Networks).	97% of our suppliers have achieved full visibility to the smelters in our supply chain. 84% of smelters identified as part of Nokia's supply chain were validated as conflict-free or are active in the validation process.	Not achieved
2020 Achieve full traceability to the smelters in our supply chain and their conflict-free status (Nokia Group).	(The same percentages are valid both for Mobile Networks and Nokia Group.)	On-going – on-track
2018 100% of all suppliers delivering high risk activity to be assessed using Nokia H&S Supplier Maturity Assessment Process.	100% of suppliers delivering high risk activities were covered by H&S Maturity Assessments and 89% of assessed suppliers met “H&S compliant supplier”-status. (Compliant=3/5 scores).	Achieved
2020 Sustained focus on CEO-sponsored Nokia Culture Principles.	In 2018 we continued to measure the favorability of employee perceptions with an anonymous employee survey (CCT). Two CCT target question scores (company direction = 80%, culture direction = 79%) remain in green, albeit the average for % favorability for these two CCT target questions was 2% down on 2017.	On-going – on-track

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<p>2020 Increasing the % of women in leadership by 25% (baseline 2016). Recognitions</p>	<p>In 2018, we had 15.3% women in leadership positions, down from the 2016 baseline of 15.5%. We continue working, within our five-year gender balance action plan, towards the 2020 target.</p>	<p>On-going – not on-track</p>
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In 2018, we were again recognized by a number of sustainability evaluation platforms for our work. We provided annual sustainability information to EcoVadis for evaluation which was then shared with customers as requested. We again made it into the top 1% of suppliers assessed, achieving excellent scores in environment, sustainable procurement, and labor practices. Also, as a result of Sustainalytics ESG Rating published in February 2018, we were judged to be amongst the best, at leader level.

Other recognitions in 2018 included being listed in the Europe, Eurozone, and World 120 indices of Euronext Vigeo, as well as being again amongst the Corporate Knights Global 100 Most Sustainable Corporations in the world. Besides the SDGs reporting award given by the Finnish Corporate Responsibility business and civic community mentioned earlier, we were very proud to be recognized by the same group of organizations in two other categories: winning Finland’s sustainability report of the year for the first time in our history, and being chosen as the investors’ favorite report.

We have provided detailed reports on our progress and performance in sustainability and corporate responsibility matters annually since 1999, and online for over a decade. For further information, refer to our People & Planet Report, which is prepared in accordance with the GRI Standards and UN Global Compact sustainability reporting guidelines, at http://www.nokia.com/en_int/about-us/sustainability.

Improving people’s lives through technology

Our customers’ radio networks serve around 6.1 billion subscriptions worldwide, an increase of 0.4 billion on the previous year. Our public target remains to help our customers connect the next billion, based on 2016 baseline, measured by number of subscriptions in Nokia radio customers’ networks and by number of fixed lines shipped to our customers.

1 bn

We have set the target of helping our customers to connect the next billion by 2022

43%

The networks we modernized brought on average energy savings of 43% for our customers

In India we announced the launch of the Smartpur project in May 2018 that aims to develop 500 digitally integrated and sustainable villages across India in line with the government's vision of Digital India. In phase 1 of the project, a pilot was rolled out in Haryana and Tamil Nadu with the Digital Empowerment Foundation (DEF), who will work as the implementation partner to develop ten such villages in each state.

The public safety community has long called for mobile broadband to support its mission to save lives. With the adoption of LTE mobile broadband technology, public safety networks can benefit from the advantages of fast and reliable broadband data and real-time video services, opening up new communications possibilities for rescue missions and disaster recovery situations. In 2018, we launched the Advanced Command Center. The solution is a step towards next generation 911 and 112 standards, enabling rich media call taking, 360-degree situational awareness

through video and IoT, and enhanced multi-agency cooperation through virtual emergency response centers.

We continued our work with NGOs, customers, and communities as part of our corporate community investment (CCI). Our key themes remained as: connecting the unconnected, empowering women, and saving lives. In 2018 we continued our greenlight4girls program globally, encouraging girls into STEM and technology careers (www.greenlightforgirls.org). We further developed our work with Save the Children in Myanmar and India, on child development and disaster preparedness respectively, and our programs with Unicef in Indonesia on health, as well as a new project in Kenya on last mile connectivity for schools.

Protecting the environment

As a company with global operations, natural and man-made disasters, many of which are said by scientists to become more frequent and severe due to climate change, may affect countries where we have manufacturing or suppliers. These effects could have a material adverse impact on our ability to supply products and services, and therefore on our potential sales. We recognize that we provide products and services globally, which inevitably affects the environment as manufacturing, distributing, and operating these products require energy and other resources. However, we believe that the opportunities our technology provides and the measures we have taken in our operations can positively contribute to counterbalancing these negative impacts.

We minimize the impact of our operations and our products in use through a robust environmental management system, putting in place the process, procedure, and policy on a global level. The system helps us to monitor our progress and identify needed improvements. Our own operational footprint is certified under ISO 14001:2015 environmental management system standard and the current coverage of employees within the scope of that certification is around 83%.

We constantly strive to drive down the energy required by our products in use in our customers' communications networks, helping them to reduce their carbon footprint as this is by far the greater part of our own carbon footprint.

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As part of our circular economy approach, we offer refurbishment, reuse and recycling of older equipment under our Asset Recovery program, as an integral component of the product lifecycle management. In 2018, we sent around 4 100 metric tons of old telecommunications equipment for materials recovery and we refurbished or reused approximately 56 000 units.

Energy efficiency and good waste management remain key in our operations. Our long-term Science Based Target, www.sciencebasedtargets.org, is to reduce operational emissions by 41% by 2030, against 2014 baseline. In 2018, for example, our electricity consumption across our facilities decreased by 3% as compared to 2017 and 27% of our total purchased electricity was from renewable sources. These actions reduce our Scope 1 and 2 emissions and help us in reaching the long-term climate target.

Zero emissions and liquid cooling

Our SBT target for scope 3 emissions covers emissions from customer use of our products, by far the greater part of our total carbon footprint. Our target is to reduce these emissions by 75% by 2030 compared to 2014 baseline. We are currently on track. In 2018, we continued to develop and offer our zero-emissions radio network solutions, including energy-saving software features and services. Our work with liquid cooling for radio base stations, which removes the need for energy-hungry air cooling systems and allows the potential to recapture wasted heat and redirect it to be used in the heating of buildings, also took a major step forward in 2018. In late November, we announced the first commercial deployment of our liquid-cooled base station solution in a Helsinki apartment block. We worked with Elisa, one of Finland's main telecom operators, and other parties.

In 2018, we delivered zero emission products to around 140 customers globally, helping them reduce their emissions. Modernization of legacy networks drives improved energy efficiency. The customer base-station sites we modernized used on average 43% less energy than those where our customers did not modernize. Not only does this reduce environmental impacts, it also provides an improved financial upside for our customers.

We have aligned our climate related disclosures, including risks, in our CDP report according to the guidance of the Task Force on Climate-related Financial Disclosures (TCFD).

Conducting our business with integrity

We consider our long-standing reputation for acting with unyielding integrity as our most important asset. Throughout our more than 150-year history we have developed and maintained a culture of high integrity, where each and every employee holds responsibility and accountability for our ethical values. Corruption, unethical behavior, and a lack of respect for human rights and fair labor conditions are major obstacles to development in many countries. Calls for greater transparency and increased integrity are growing as is increased regulation. As we build on our long tradition of integrity, we strive every day to ensure that excellence and innovation also define compliance at Nokia. Our compliance program and processes have remained agile against the backdrop of an ever-shifting risk landscape, as issues such as privacy, information security and trade compliance take on ever-greater importance. By upholding high standards of ethics and human rights in our own activities and throughout our value chain, we can be part of a positive solution. Neglecting these issues would present a major risk for our reputation and our business.

To mitigate the risks, our Code of Conduct is applied across our operations to protect our reputation and to help build greater personal integrity across our employee base, from top management to individual employees. This is further supplemented with a Code of Ethics applicable to Nokia's President and Chief Executive Officer, Chief Financial Officer, Deputy Chief Financial Officer and Corporate Controller (the "Officers"). The Code of Conduct sets down the key principles and practices of our ethical business approach and provides clear guidance to our employees as well as other stakeholders we work with. The Code of Conduct is further enhanced by 14 key business policy statements

which cover: Improper Payments/Anti-Corruption, Conflict of Interests, Fair Competition, Privacy, Dealing with Government Officials, Intellectual Property & Confidential Information, Working with Suppliers, Trade Compliance, Insider Trading, Health, Safety & Labor Conditions, Controllership, Fair Employment Practices, Human Rights, Environment, and operational guidance on third-party screening and corporate hospitality. In 2018, we also deployed a separate code of conduct for third parties, along with relevant training.

Our engagement on these issues with our employee base continued in 2018. Our Ethical Business Training was again mandatory for all employees. In 2018, the training was completed by 95% of our employees, reaching the target of 95%.

Anti-corruption and bribery

Our Code of Conduct covers for example anti-corruption and bribery issues and is further supported by our internal Anti-Corruption Policy. We employ a multi-faceted approach to anti-corruption issues. We have clear and unequivocal policies concerning improper payments, facilitation payments, gifts and hospitality, sponsorships and donations, and other risk areas. We carry out training and regularly communicate to our employees regarding risks, and we review these risks and our mitigation measures with the company's senior leadership and Audit Committee. We conduct periodic audits and risk assessments to ensure that we identify and respond to anti-corruption risks. We also have a Compliance Controls Framework (CCF). This is a bottom-up exercise which includes internal gap-analysis workshops and localized risk mitigation plans. As per our target, the Ethics & Compliance team together with relevant senior leaders carried out 22 CCF reviews during 2018. We carried out risk-based due diligence procedures for different categories of third parties (suppliers and business partners) to assess and to manage potential risks related to engaging and working with them. We also screen new suppliers as part of our anti-corruption supplier program, using two levels of screening according to perceived risk.

Targeted training is delivered via multiple mediums, ranging from online courses to instructional videos to face-to-face training. In 2018, anti-corruption training was delivered to business groups; to relevant stakeholders; to regional groups, including country engagement sessions; and to service companies, with over 7 800 individuals receiving face-to-face training in the 236 live training sessions held across the globe. We also celebrated Nokia's Integrity Day on November 8, 2018, where face-to-face events were held at 90 sites across the world with over 7 500 employees enthusiastically participating in our numerous events that are aimed at creating awareness.

Oversight and grievance mechanisms

In 2018, as in previous years, leadership involvement and oversight of ethics and compliance were provided by the Board via the Audit Committee, which convened eight times in 2018, and covered ethics and compliance topics in six of those meetings. Employees and external stakeholders are urged to report any ethical misconduct using our dedicated Nokia EthicsPoint channels via email, phone or online, anonymously if desired.

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In 2018, our Ethics & Compliance office received 887 concerns, of which 248 were investigated by our Business Integrity group as alleged violations of our Code of Conduct. We also implemented corrective actions including 24 dismissals and 16 written warnings following these and other investigations. Specifically, two concerns were received as alleged violations of our anti-bribery policies, involving third parties, but neither of these concerns was substantiated. The Ombuds Program continues to be deployed across the globe to further strengthen our speak-up culture. The vast network of 200+ Local Ombuds Leaders actively promotes the program and serves as confidential and neutral resources for employees that have compliance questions and concerns. In 2018, 8% of Ethics Helpline cases were reported through our ombuds channels, clearly showing a steady increase in utilization.

We were honored by the Ethisphere Institute both in 2018 and in 2019 as one of the World's Most Ethical Companies, owing to our strong compliance program, culture, and bold vision for the future.

Human rights – Freedom of expression and privacy

Our Code of Conduct together with our Human Rights Policy sets out our approach to human rights. Our Human Rights Due Diligence process, which is embedded in our global sales process, provides the mechanism and tools to effectively deal with our most salient human rights risks arising from the potential misuse of the products and technology we provide. We aim to ensure the technology we provide is not used to infringe human rights, including the right to privacy, freedom of expression and assembly. In addition to potential product misuse, our biggest human rights risks lay in our global supply chain. Our supply chain risks and activities are further discussed in the Responsible Sourcing section below.

In 2018, we undertook an internal product-related Human Rights Impact Assessment conducted by an external human rights expert. This assessment will help us identify areas for improvement or further development. It also serves as preparation for a full blown external Human Rights assessment in 2019 as part of our continued membership in the Global Network Initiative (GNI). The GNI is a multi-stakeholder group of companies, civil society organizations (including human rights and press freedom groups), investors, and academics working together to protect and advance freedom of expression and privacy in the ICT sector. The internal and external assessments are carried out against the GNI Guiding Principles available on the GNI website at www.globalnetworkinitiative.org.

Combatting modern slavery

Our work on Modern Slavery continued in 2018, as we worked with other members and advisory organizations to define the longer-term strategy and activities of the Tech against Trafficking initiative launched in June 2018. The initiative looks at the role of digital technology in combatting modern slavery, and is initially mapping and analyzing the landscape of existing tech-focused solutions that tackle modern slavery. During the year we also published our second Modern Slavery statement.

Responsible sourcing

Our Code of Conduct primarily directs how we work in Nokia, but we also encourage our suppliers to support our Code, which is supplemented with our Supplier Requirements. Our Supplier Requirements are applied to all our suppliers, included in supplier contract appendices detailing our requirements related to suppliers. The Requirements cover such topics as environment, security, privacy, risk management, human resources management and health. We further carry out assessments and audits of our suppliers, as well as training, to ensure they meet our ethical requirements and continually improve on their performance.

In 2018, we implemented 364 supply chain audits (393 in 2017), including 75 on-site audits on corporate responsibility topics: 38 were on-site audits against our supplier requirements and 251 suppliers were assessed using

the EcoVadis scorecards. We also ran training workshops for suppliers operating in high-risk countries. In 2018, we organized online training for example on climate change, conflict-free sourcing and corporate responsibility topics, and arranged face-to-face training workshops establishing improvement plans and actions. These trainings covered altogether 393 suppliers. We continued our work with the Joint Audit Committee (JAC), a group of our major customers who collaborate to drive improvement and transparency in supply chain management. In 2018, we signed an agreement with the JAC organization to participate in the JAC Academy involving common training of supply chain auditors.

Health & Safety remained a key component of our work with suppliers, particularly through our H&S Maturity Assessments with high-risk suppliers covering those who drive, work at height or with electricity. By the end of 2018, 100% of suppliers delivering high-risk activity had been assessed using our H&S Maturity Assessment Process and 89% of assessed suppliers met “H&S compliant supplier” -status.

The potential risks associated with the mining and minerals trade of metals that provide key minerals in electronic components may include impacts related to military conflict, human rights violations, as well as negative environmental impacts. This is one reason why the traceability of our materials and ensuring our products are conflict-free is a priority for us, as evident in our Conflict Minerals Policy which can be found online. While our focus has previously been on tin, tantalum, tungsten and gold, in 2018 we also added cobalt into our due diligence scope.

In 2018, 84% (83% in 2017) of smelters identified as part of Nokia’s supply chain have been validated as conflict-free or are active in the validation process. Our Conflict Minerals Report was also updated during the year. It can be found at http://www.nokia.com/en_int/about-us/sustainability/downloads.

We continued our work with our supply chain through the CDP Supply Chain Program, creating environmental improvement programs and improving our upstream indirect emissions that occur in the chain. In 2018, 314 of our key suppliers responded to the CDPs request to disclose their climate performance information and 187 also provided emission reduction targets. For the first time, we also had 150 suppliers responding on the water aspect via the CDP program.

All of our above mentioned assessment programs were incorporated into the sustainability pillar of our Supplier Performance Evaluation.

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Respecting our people

The market for skilled employees in our business remains extremely competitive. The ability to attract, motivate, and keep talent has an impact on how well we are able to manage our revenue and cost-related opportunities and risks. Ongoing strategy implementation to achieve our business goals has over recent years meant fluctuation in our workforce. The effects of such changes can cause disruption among employees and even fatigue, it is therefore essential that we continue to build a motivational corporate culture that provides equal opportunity and fosters innovation and continuous learning.

In 2018, the average number of employees was 103 083 (101 731 in 2017 and 102 687 in 2016). The total amount of salaries and wages paid in 2018 was EUR 6 356 million (EUR 6 456 million in 2017 and EUR 6 275 million in 2016). Refer to Note 10, Personnel expenses, of our consolidated financial statements in this annual report on Form 20 F.

The table below shows the average number of employees in 2018, by geographical location:

Region	Average number of employees
Finland	6 159
Other European countries	34 362
Middle East & Africa	3 747
China	17 214
Asia-Pacific	23 066
North America	14 247
Latin America	4 288
Total	103 083

In 2018, we again measured the favorability of employee perceptions about company and culture with an anonymous employee survey. The survey result was 79.5% favorable towards the company, down by 2%, as measured by the average of the two target questions. The target question “Overall, as a company, Nokia is heading in the right direction” was 80% favorable, down 3 points from 2017 and the other target question “Overall, Nokia’s culture is heading in the right direction” was 79% favorable, off one point from 2017. In 2018, we engaged employees with initiatives which helped apply our cultural principles. We concentrated on global webcasts, educational and fun cartoon strips, a roving reporter who discovered true cases of the company spirit, as well as through applied neuroscientific solutions.

We are committed to employee development and career growth. In 2018, we conducted multiple sessions on equipping employees on how to manage personal and career development. In addition, we maximized visibility by promoting our personal and career development offering including coaching, mentoring, personal development plan, regular quarterly dialog, 360° feedback, Harvard Manage Mentor, Insights, and Team Management Profile. In 2018, we also included job rotations to our internal job market. With job rotations we give employees the opportunity to test drive new functional areas and develop new competences.

To nurture the learning culture, we introduced the Learning Index, measuring formal and social learning. Employees are awarded points for learning and sharing activities, where critical, priority-based learning is allocated bonus points. With the Learning Index, we are able to track our commitment as an organization to learning and sharing knowledge. Overall in 2018, each employee spent an average of approximately 34 hours on training (16 in 2017).

We again emphasized diversity, inclusion and anti-discrimination as a key premise of our employee makeup. In 2018, we trained around 900 managers on inclusive leadership best practices. We signed the United Nations’ Global Standards of Conduct, which specifically pledges for LGBT+ rights at the workplace. Our Chief Legal Officer and Head of Nokia Technologies, Maria Varsellona, is the sponsor of the LGBT+ community rights at Nokia. We also

contributed to a Europe-wide commitment to inclusion by signing a pledge of the European Round Table of Industrialists (ERT). ERT and Nokia Chairman of the Board, Risto Siilasmaa, as the sponsor of inclusion, call for a series of inclusion actions to help maintain and strengthen the workplace, and society. We reached our gender goal of 40% of the Board of Directors being women by 2020. In 2018, approximately 15.3% (15.2% in 2017) of our leadership positions were held by women. In total, women accounted for 22% (22% in 2017) of Nokia's workforce in 2018.

Labor conditions

Our labor conditions are founded on our Code of Conduct, supported by a full set of global human resources policies and procedures that enable fair employment. We adhere to the International Labor Organization (ILO) Declaration on Fundamental Principles and Rights at Work and we meet the requirements of labor laws and regulations wherever we have operations, in many instances where possible attempting to exceed those laws and regulations.

We work hard to ensure decent working conditions and fair employment, taking into account both international and local laws and guidelines.

Health and safety remains a key priority for us. We implement training, analysis, assessments and consequence management to address job-related health and safety risks. We run a wide range of programs targeted at constantly improving our health and safety performance, while also encouraging employees and contractors to report near misses and dangerous incidents. We see the highest risk in the health and safety of our contractors who for example work at height or with electricity. Consequently, we have set stringent key performance indicators related to the supplier Health and Safety Maturity Assessment Process. Internally, we continued to build on our corporate wellness program Healthier Together, providing opportunities for all employees to enjoy an active lifestyle and contributing to making Nokia a healthy place to work.

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Making change happen together

We understand in order to achieve the greatest impact in our work to help achieve the SDGs, we need to work with a broad range of stakeholders, including our customers, suppliers, non-governmental organizations (NGOs), academia, governmental organizations, authorities and other industries.

Cooperating with others in our industry and beyond

In 2018, we held memberships in, for example, the United Nations Global Compact, Global e-Sustainability Initiative, CDP supply chain program, Global Network Initiative, Digital Europe, Responsible Mineral Initiative (formerly Conflict-Free Sourcing Initiative), GSMA Humanitarian Connectivity Charter and several standardization and university cooperation groups. We continued our structured engagement with the World Economic Forum, the Broadband Commission and ITU Telecom World, amongst others.

Working with NGOs

Core to our Corporate Community Investment work is the longer-term target to improve the lives of 2 000 000 people over the period 2016 to 2025 through our corporate and key regional social investment programs. In 2018, we again focused our action on gender balance, connectivity, and health, and the use of technology to improve people's lives. By the end of 2018, around 1 426 600 people have directly benefitted from our programs.

In 2018, we continued our support for the UNICEF mHealth program in Indonesia which uses technology to transform and ensure the delivery of health and nutrition services. We also undertook a UNICEF program to connect schools in Kenya using our technology. The multi-year signature program with Save the Children in Myanmar again emphasized early childhood care and education development centers. Our offices around the world also continued to run greenlight4girls days inviting local schoolgirls, many from less privileged backgrounds, to experience technology and encourage them into STEM education. We also worked with several local NGOs within tens of our sites, providing support for the surrounding communities and common volunteering experiences for our employees.

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Shares and share capital

Share details

Nokia has one class of shares. Each Nokia share entitles the holder to one vote at General Meetings of Nokia.

As of December 31, 2018, the total number of Nokia shares was 5 635 945 159 and our share capital equaled EUR 245 896 461.96. As of December 31, 2018, Nokia and its subsidiary companies owned a total of 42 782 966 Nokia shares, representing approximately 0.8% of the total number of the shares and voting rights of the company.

For information on remuneration and shares held by the Board of Directors, the President and CEO and the other members of the Group Leadership Team, refer to “Corporate governance—Corporate governance statement and —Compensation”. For more information regarding corporate governance at Nokia, refer to “Corporate governance—Corporate governance statement” or to our website at http://www.nokia.com/en_int/investors/corporate-governance.

On February 2, 2018, Nokia cancelled 207 897 644 shares.

In 2018, under the authorization held by the Board of Directors, we issued 424 500 new shares following the holders of stock options issued in 2012 and 2013 exercising their option rights. In addition, we issued 4 014 000 new shares without consideration to Nokia to be transferred to fulfil our obligation under the Nokia Equity Programs.

In 2018, under the authorization held by the Board of Directors, we issued a total of 13 220 987 treasury shares to our employees, including certain members of the Group Leadership Team, as settlement under Nokia’s equity-based incentive plans. The shares were issued without consideration and in accordance with the plan rules. The total number of treasury shares issued represented 0.2% of the total number of shares and the total voting rights as of December 31, 2018. The issuances did not have a significant effect on the relative holdings of other Nokia shareholders, or on their voting power.

Information on the authorizations held by the Board of Directors in 2018 to issue shares and special rights entitling to shares, to transfer shares and repurchase own shares, as well as information on related party transactions, the shareholders, stock options, shareholders’ equity per share, dividend yield, price per earnings ratio, share prices, market capitalization, share turnover and average number of shares is available in the “Corporate Governance—Compensation”, “Financial Statements” and “General facts on Nokia—Shares” sections.

Refer to Note 20, Shares of the Parent Company, of our consolidated financial statements included in this annual report on Form 20-F for further information regarding Nokia shares.

Dividend

The Board of Directors proposes that the 2019 Annual General Meeting authorizes the Board to resolve on the maximum annual distribution of EUR 0.20 per share to be paid quarterly during the authorization period. The annual distribution would be paid as quarterly dividends from retained earnings and/or assets from the fund for invested unrestricted equity.

The proposed dividend is in line with our distribution target. The dividend to shareholders is Nokia’s principal method of distributing earnings to shareholders. Over the long term, Nokia targets to deliver an earnings-based growing dividend by distributing approximately 40% to 70% of diluted earnings per share (EPS), excluding unallocated items(1), taking into account Nokia's cash position and expected cash flow generation. Beginning with the distribution

for 2018, Nokia plans to pay dividends in quarterly installments.

We distribute distributable funds, if any, within the limits set by the Finnish Companies Act as defined below. We make and calculate the distribution, if any, in the form of cash dividends, assets from the fund for invested unrestricted equity, share buy-backs, or in some other form, or a combination of these. There is no specific formula by which the amount of a distribution is determined, although some limits set by law are discussed below. The timing and amount of future distributions of retained earnings and/or assets from the fund for invested unrestricted equity, if any, will depend on our future results and financial conditions.

Under the Finnish Companies Act, we may distribute retained earnings and/or assets from the fund for invested unrestricted equity on our shares only upon a shareholders' resolution and subject to limited exceptions in the amount proposed by the Board. The amount of any distribution is limited to the amount of distributable earnings of the Parent Company pursuant to the last accounts approved by our shareholders, taking into account the material changes in the financial situation of the Parent Company after the end of the last financial period and a statutory requirement that the distribution of earnings must not result in insolvency of the Parent Company. Subject to exceptions relating to the right of minority shareholders to request a certain minimum distribution, the distribution may not exceed the amount proposed by the Board of Directors.

(1) Includes costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

Articles of Association

Our Articles of Association are available on our website www.nokia.com/en_int/investors/corporate-governance. Amendment of the Articles of Association requires a resolution of the general meeting of shareholders, supported by two-thirds of the votes cast and two-thirds of the shares represented at the meeting. For information on our Articles of Association, refer to "General facts on Nokia—Memorandum and Articles of Association".

Our Articles of Association include provisions for obligations to redeem our shares. Amendment of the provisions of Article 13 of the Articles of Association, "Obligation to purchase shares", requires a resolution supported by three-quarters of the votes cast and three-quarters of the shares represented at the meeting.

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Risk factors

Set forth below is a description of risk factors that could affect our business. Shareholders and potential investors should carefully review the following risk factors, in addition to other information contained in this annual report on Form 20-F. The risk factors described below should not be construed as exhaustive. There may be additional risks that are unknown to us and other risks currently believed to be immaterial that could turn out to be material.

These risks, either individually or collectively, could adversely affect our business, sales, profitability, results of operations, financial condition, competitiveness, costs, expenses, liquidity, market share, brand, reputation and share price. Unless otherwise indicated or the context otherwise requires, references in these risk factors to “Nokia”, the “Nokia Group”, “Group”, “we”, “us” and “our” mean Nokia’s consolidated operating segments. Certain risks or events may be more prevalent with respect to Nokia or a certain business group, business or part of the Group.

Additional risks and uncertainties not presently known to us, or that are currently believed to be immaterial, could impair our business or the value of an investment made in it. This annual report on Form 20-F also contains forward-looking statements that involve risks and uncertainties presented in “Forward-looking statements” above.

Our strategy is subject to various risks and uncertainties and we may be unable to successfully implement our strategic plans, sustain or improve the operational and financial performance of our business groups, correctly identify or successfully pursue business opportunities or otherwise grow our business.

In October 2018, we announced plans to accelerate strategy execution, sharpen customer focus, and maintain long-term cost leadership. For further information refer to “Business Overview—Our strategy” and “Operating and financial review and prospects—Principal industry trends affecting operations”.

We operate in rapidly changing and innovative industries and the opportunities we pursue may require significant investments in innovation in order to generate growth, profitability or other targeted benefits across our business. Our strategy, which includes targeted investments in our business and pursuing new business opportunities based on identified trends and opportunities, may not yield a return on our investment as planned or at all. Our ability to achieve strategic goals and targets is subject to a number of uncertainties and contingencies, certain of which are beyond our control, and there can be no assurance that we will correctly identify trends or opportunities to pursue or be able to achieve the goals or targets we have set. We continuously target various improvements in our operations and efficiencies through investing in R&D, entering into licensing arrangements, acquiring businesses and technologies, recruiting expert employees and partnering with third parties. There can be no assurance that our efforts will generate the expected results or improvements in our operations or that we will achieve our intended targets or financial objectives related to such efforts. Any failure to achieve our strategy may materially and adversely affect our business, financial condition and results of operations. Furthermore, there can be no assurance that our investments will result in technologies, products or services that achieve or retain broad or timely market acceptance, answer to the expanding needs or preferences of our customers or consumers, or break-through innovations that we could otherwise utilize for value creation.

As part of our strategy, we have and may continue to acquire or divest assets. For instance, in 2018 we acquired SpaceTime Insights and Unium for the purpose of advancing our strategies regarding Software, IoT and Fixed Networks business. We may fail to complete planned acquisitions or divestments or to integrate acquired businesses or assets. Any such result could interfere with our ability to achieve our strategy, obtain intended benefits, retain and motivate acquired key employees, or timely discover all liabilities of acquired businesses or assets, which may have a material adverse effect on our business.

We may be materially and adversely affected by general economic and financial market conditions and other developments in the economies where we operate.

As we are a company with global operations and sales in many countries around the world, our sales and profitability are dependent on general economic and financial market conditions both globally and regionally. We have manufacturing facilities and suppliers located in various countries around the world which may equally be impacted by these conditions. Adverse developments in, or the general weakness of, economic conditions, such as unemployment or consumer spending, may have an adverse impact on the spending patterns of end-users. This, in turn, may affect demand of consumables, such as mobile devices which would have an adverse effect on our Technologies business. In our Networks business, this may also affect both the services that end-users subscribe to and the usage levels of such services, which may lead mobile operators and service providers to invest less in related infrastructure and services or to invest in low-margin products and services. Likewise, adverse developments in economic conditions may lead vertical customers, i.e. webscale companies, TXLE, transportation, energy, public safety, to invest less in infrastructure and services to digitize their operations or to invest in low-margin products and services. These all could have a material adverse effect on our business, financial condition, and results of operations.

General uncertainty and adverse developments in the financial markets and the general economy could have a material adverse effect on our or our suppliers' ability to obtain sufficient or affordable financing on satisfying terms. Uncertain market conditions may increase the price of financing or decrease its availability. We or our suppliers could also encounter difficulties in raising funds or accessing liquidity necessary to maintain financial condition and results of operations.

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We face intense competition and are dependent on development of the industries and markets in which we operate. The information technology and communications industries and related services market are cyclical and are affected by many factors, including the general economic environment, technological changes, competitor behavior, purchase and spending behavior of service providers, consumers and businesses, deployments and roll-out timing.

Our sales and profitability are dependent on the development of the industries in which we operate, including the information technology and communications and related services market in numerous markets around the world. The competitive environment in the markets where we operate continues to be intense and is characterized by maturing industry technologies, equipment price erosion and aggressive price competition. For instance, we are particularly dependent on the investments made by mobile operators and network service providers in network infrastructure and related services. The pace and size of such investments are in turn dependent on the ability of network service providers and mobile operators to increase their subscriber numbers, reduce churn and compete with business models eroding revenue from traditional voice, messaging and data transport services, as well as the financial condition of such network service providers and mobile operators.

Mobile operators' cost reductions and network sharing, and industry consolidation among operators have reduced the amount of available business, resulting in further competition and pressure on pricing and profitability. Consolidation of operators may result in vendors and service providers concentrating their business in certain service providers and increasing the possibility that agreements with us are terminated or not renewed. In addition, the investments of the mobile operators in the new spectrum assets may reduce their funds available for investing the new network infrastructure and related services. Furthermore, the level of demand by service providers and other customers that purchase our products and services can change quickly and can vary over short periods of time. In addition, a portion of our revenues is driven by the timing of completion and customer acceptances, which particularly in relation to 5G are further dependent on maturity of the whole 5G ecosystem. As a result of the uncertainty and variations in the telecommunications and vertical industries, accurately forecasting revenues, results and cash flow remains difficult.

Market developments favoring new technological solutions, such as SDN, cloud, and virtualization may result in reduced spending for the benefit of our competitors who have, or may have, a stronger position in such technologies. The technological viability of standardized, low-margin hardware products in combination with the virtualization of functions can induce a change in purchase behavior, resulting in favoring other vendors or in higher bargaining power versus Nokia due to more alternative vendors. Additionally, new competitors may enter the industry as a result of acquisitions or shifts in technology. For example, the virtualization of core and radio networks and the convergence of IT and telecommunications may lower barriers of entry for IT companies in the traditional telecommunications industry or they may build up tight strategic partnerships with our traditional competitors. Additionally, some companies, including webscale companies, may drive a faster pace of innovation in telecommunication infrastructure through more collaborative approaches and open technologies across access, backhaul, core and management. If we are unable to respond successfully to competitive challenges in the markets in which we operate, our business, financial condition and results of operations may be materially and adversely affected.

We expect to generate a significant share of our growth from new customers, including webscale companies and vertical customers in energy, transport, public sector, manufacturing and TXLEs. Each of these sectors may face adverse industry developments which may significantly impact the size of investments addressable by us and our ability to address these investments, in terms of both having the right products available and being able to attain new customers. Furthermore, there are various incumbent and new players competing with Nokia in these customer groups we strategically target. With these types of customers, the nature of competition and the required capabilities can be significantly different from the communications service provider market, including competition based on access network, core network, Cloud infrastructure, platforms, applications and devices, and related services.

We compete with companies that have large overall scale, which affords such companies more flexibility (e.g. on pricing). We also continue to face intense competition globally, including from companies based in China which endeavor to gain further market share and broaden their presence in new areas of the network infrastructure and related services business (e.g. by providing lower-cost products and services). Competition for new customers, as well as for new infrastructure deployment, is particularly intense and focused on the favorability of price and agreement terms.

Examples of other risks and uncertainties impacting our success in the industries we operate, include:

- § our ability to correctly estimate technological developments, including the impending turn to 5G, or adapt successfully to such developments;
- § the development of the relevant markets and/or industry standards in directions that leave us deficient in certain technologies and industry areas that impact our overall competitiveness;
- § the choice of our customers to turn to alternative vendors to maintain end-to-end services from such vendors;
- § our ability to successfully develop market recognition as a leading provider of software and services in the information technology and communications and related services market, as well as with our vertical customers in energy, transport, public sector, webscale, manufacturing and TXLEs;
- § our ability to sustain or grow net sales in our business and areas of strategic focus, which could result in the loss of benefits related to economies of scale and reduced competitiveness;
 - § our ability to identify opportunities and enter into agreements that are commercially successful; and
- § our ability to continue utilizing current customer relations to advance our sales of related services, or pursue new service-led growth opportunities.

Our inability to overcome any of the above risks or uncertainties could have a material adverse effect on our results of operations or financial performance.

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We may fail to effectively and profitably invest in new competitive high-quality products, services, upgrades and technologies or bring them to market in a timely manner or fail to adapt to changing business models.

Our business and the markets where we operate are characterized by rapidly evolving technologies, frequent new technological requirements, product feature introductions and evolving industry standards. The participants in the information technology, communications and related services market compete on the basis of product offerings, technical capabilities, quality, price and affordability through consumer financing arrangements. As a result, our business performance depends on the timely and successful introduction of new products, services and upgrades of current products to meet the evolving requirements of customers, comply with emerging industry standards and address competing technological and product developments carried out by competitors while keeping prices and costs at competitive levels.

The R&D of new and innovative, technologically advanced products, as well as upgrades to current products and new generations of technologies, is a complex and uncertain process requiring high levels of innovation and investment, in addition to accurate anticipation of technological, regulatory and market trends. We may focus our resources on products and technologies that do not become widely accepted or ultimately prove unviable. Additionally, many of our current and planned products are highly complex and may contain defects or errors that are, for instance, detected only after deployment in telecommunications networks. Our results of operations will depend to a significant extent on our ability to succeed in the following areas:

- § maintaining and developing a competitive product portfolio and service capability that are attractive to our customers, for instance by keeping pace with technological advances in our industry and pursuing the technologies that become commercially accepted;
- § continuing to introduce new products and product upgrades successfully and on a cost-efficient and timely basis;
- § developing new or enhancing existing tools for our services offerings;
- § optimizing the amount of customer or market specific technology, product and feature variants in our product portfolio;
- § continuing to meet expectations and enhance the quality of our products and services as well as introducing products and services that have desired features and attributes, such as energy efficiency;
- § pricing products and services appropriately, which is crucial in the networks infrastructure business due to the typical long-term nature and complexity of the agreements;
- § maintaining and building up strategic partnerships in our value creation chain (e.g. in product creation and in project delivery); and
- § leveraging our technological strengths.

Any failure by us to effectively and profitably invest in new competitive products, services, upgrades or technologies (such as 5G, IoT, the cloud or software) and bring them to market in a cost-efficient, timely manner could result in a loss of net sales and market share and have a material adverse effect on our results of operations, competitiveness, profitability and financial condition.

Certain of our competitors have significant resources to invest in market exploration and may seek new monetization models or drive industry development and capture value in areas where we may not currently be competitive or do not have similar resources available to us. These areas may include monetization models linked to large amounts of consumer data, large connected communities, home or other entertainment services, alternative payment mechanisms or marketing products. We also face competition from various companies that may be able to develop technologies or products that become preferred over those developed by us or result in adverse effects on us through, for instance, developing technological innovations that make our innovations less relevant.

We must introduce high-quality products and services in a cost-efficient, timely manner and manage proactively the costs related to our portfolio of products and services, including component sourcing, manufacturing, logistics and

other operations. If we fail to maintain or improve our market position, competitiveness or scale, or if we fail to leverage our scale to the fullest extent and keep prices and costs at competitive levels or provide high-quality products and services, this could materially and adversely affect our competitive position, business and results of operations, particularly our profitability.

We are dependent on a limited number of customers and large multi-year agreements. The loss of a single customer or contract, operator consolidation, unfavorable contract terms or other issues related to a single agreement may have a material adverse effect on our business and financial condition.

A significant proportion of the net sales that we generate have historically been derived from a limited number of customers. As consolidation among existing customers continues, it is possible that an even greater portion of our net sales will be attributable to a smaller number of large service providers operating in multiple markets. These developments are also likely to increase the impact on our net sales based on the outcome of certain individual agreement tenders.

Mobile operators are increasingly entering into network sharing arrangements, as well as joint procurement agreements, which may reduce their investments and the number of networks available for us to service. Furthermore, procurement organizations of certain large mobile operators sell consulting services to enhance the negotiating position of small operators with their vendors. As a result of these trends and the intense competition in the industry, we may be required to agree to increasingly less favorable terms in order to remain competitive. Any unfavorable developments in relation to, or any change in the agreement terms applicable to, a major customer may have a material adverse effect on our business, results of operations and financial condition. Also, due to the long-term nature of the agreements, it is possible that the contract terms of the agreement may prove less favorable to us than originally expected, for instance due to changes in costs and product portfolio decisions.

We may lose existing agreements, or we are unable to renew or gain new agreements due to customer diversity policies that limit the ability of customers to have one network provider exceeding a certain threshold of business in a given market. Policies or practices in certain countries may also limit the possibility for foreign vendors to participate in certain business areas over a certain threshold.

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Furthermore, there is a risk that the timing of sales and results of operations associated with large multi-year agreements, which are typical in the mobile infrastructure and related services business, will differ from expectations. Moreover, such agreements often require dedication of substantial amounts of working capital and other resources, which may adversely affect our cash flow, particularly in the early stages of an agreement's term, or may require us to continue to sell certain products and services, or to sell in certain markets, that would otherwise be discontinued or exited, thereby diverting resources from developing more profitable or strategically important products and services, or focusing on more profitable or strategically important markets. Furthermore, our customer agreements may involve complex transformation of the networks as the customers deploy new technologies and the related costs and scope of required deliverables may differ from our expectations at the time we enter into these such agreements. Any suspension, termination or non-performance by us under an agreement's terms may have a material adverse effect on us (e.g. due to penalties for breaches or early termination).

Our patent licensing income and other intellectual property-related revenues are subject to risks and uncertainties such as our ability to maintain our existing sources of intellectual property-related revenue, establish new sources of revenue and protect our intellectual property from infringement. A proportionally significant share of the current patent licensing income is generated from the smartphone market which is rapidly changing and features a limited number of large vendors.

We have a long history of investing significantly in R&D to develop new relevant technologies, products and services for our business, and continue to do so. We have one of the industry's strongest intellectual property portfolios, including numerous standardized or proprietary patented technologies in our Nokia Technologies business group and in our other business groups. Many of our products and services use or are protected by patents in these portfolios. We also generate revenue by licensing, and we seek to renew existing license agreements and negotiate new license agreements. We also seek to expand the scope of our licensing activities to other industries, in particular those that implement mobile communication technologies. The continued strength of our portfolios depends on our ability to create new relevant technologies, products and services through our R&D activities and to protect our IPR. If those technologies, products and services do not become relevant, and therefore attractive to licensees, the strength of our intellectual property portfolios could be reduced, which could adversely affect our ability to use our intellectual property portfolios for revenue generation. Our intellectual property-related revenue can vary considerably from time to time based on factors such as the terms of agreements we enter into with licensees, and there is no assurance that past levels are indicative of future levels of intellectual property-related revenue.

Despite the steps that we have taken to protect our technology investments with IPR, we cannot be certain that any rights or pending applications will be granted or that the rights granted in connection with any future patents or other IPR will be sufficiently broad to protect our innovations. Third parties may infringe our intellectual property relating to our proprietary technologies or disregard their obligation to seek a license under our SEPs or seek to pay less than reasonable license fees. If we are unable to continue to develop or protect our intellectual property-related revenue or establish new sources of revenue, this may materially and adversely affect our business, financial position and results of operations.

The Nokia Technologies business group's sales and profitability are currently largely derived from patent licensing. Patent licensing income may be adversely affected by general economic conditions or adverse market developments, as well as regulatory and other developments with respect to protection awarded to technology innovations or compensation trends with respect to licensing. For example, our patent licensing business may be adversely affected if a licensee's ability to pay is reduced or they become insolvent or bankrupt. Additionally, poor performance of potential or current licensees may limit a licensee's motivation to seek new or renew existing licensing arrangements with us. In certain cases, patent licensing income is dependent on the sales of the licensee, where the reduced sales of the licensee have a direct effect on the patent licensing income received by the Nokia Technologies business group.

We enforce our patents against unlawful infringement and generate revenue through realizing the value of our intellectual property by entering into license agreements and occasionally through business transactions. Patent license agreements can cover both licensees' past and future sales. The portion of the income that relates to licensees' past sales is not expected to have a recurring benefit and ongoing patent income from licensing is generally subject to various factors that we have little or no control over, for instance sales by the licensees.

In certain cases, we have initiated litigation to enforce our patents. In other cases, we have used arbitration proceedings to establish the terms of compensation between the parties. Due to the nature of any litigation or arbitration proceedings, there can be no assurances as to the final outcome or timing of any outcome of litigation, arbitration or other resolution.

Regulatory developments, actions by authorities, or applications of regulations may adversely affect our ability to protect our intellectual property or create intellectual property-related revenue. Any patents or other IPR may be challenged, invalidated or circumvented, and any right granted under our patents may not provide competitive advantages for us. Our ability to protect and monetize our intellectual property may depend on regulatory developments in various jurisdictions and the implementation of the regulations by administrative bodies. Our ability to protect, license or divest our patented innovations may vary by region. In the technology sector generally, certain licensees are actively avoiding license payments, while some licensors are using aggressive methods to collect license payments, with both behaviors attracting regulatory attention. Authorities in various countries have increasingly monitored patent monetization and may aim to influence the terms on which patent licensing arrangements or patent divestments may be executed. Such terms may be limited to a certain country or region; however, authorities could potentially seek to widen the scope and even impose global terms, potentially resulting in an adverse effect on us or limiting our ability to monetize our patent portfolios.

Intellectual property-related disputes and litigation are common in the technology industry and are often used to enforce patents and seek licensing fees. Other companies have commenced and may continue to commence actions seeking to establish the invalidity of our intellectual property, including our patents. In the event that one or more of our patents is challenged, a court may invalidate the patent or determine that the patent is not enforceable, which could have an impact on our competitive position. The outcome of court proceedings is difficult to predict and, consequently, our ability to use intellectual property for revenue generation may from time to time depend on favorable court rulings. Additionally, if any of our patents is invalidated, or if the scope of the claims in any patents is limited by a court decision, we could be prevented from using such patents as a basis for product differentiation or from licensing the invalidated or limited portion of our IPR. Even if such a patent challenge is not successful, the related proceedings could be expensive and time-consuming, divert the attention of our management and technical experts from our business and have an adverse effect on our reputation. Any diminution in the protection of our IPR could cause us to lose certain benefits of our R&D investments.

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We retained our entire patent portfolio after the sale of D&S business in 2014. Following the sale of D&S business, Nokia Technologies is no longer required to agree cross-licenses to cover its handset business, which has contributed to growing our licensing revenue. While this has been our practice, there can be no guarantee that this can be continued in future. In the past, parts of our intellectual property development were driven by innovation from the Devices & Services Business. As we no longer own this business, our future intellectual property relating to the mobile phone sector may lessen and our ability to influence industry trends and technology selections may reduce.

We also enter into business agreements separately within our business groups which may grant certain licenses to our patents. Some of these agreements may inadvertently grant licenses to our patents with a broader scope than intended, or they may otherwise make the enforcement of our patents more difficult.

We conduct our business globally, being subject to direct and indirect regulation and exposing us to geopolitical risks, including unfavorable or unpredictable treatment in relation to trade tariffs, tax matters, exchange controls, and other restrictions. Changes in various types of regulations or their application, applicable to current or new technologies or products, may adversely affect our business and results of operations. Our governance, internal controls and compliance processes could fail to prevent regulatory penalties at corporate level, operating subsidiaries and in joint ventures.

We develop many of our products based on existing regulations and technical standards, our interpretation of unfinished technical standards or, in certain cases, in the absence of applicable regulations and standards. We generate sales from, collaborate and have R&D and manufacturing facilities and suppliers located in, various countries around the world. Regulatory and economic developments, sometimes unexpected and dramatic, impacting our ability to timely react to such developments, political turmoil, trade barriers, military actions, labor unrest, civil unrest, and public health and safety threats (such as disease outbreaks), could have a material adverse effect on our ability to supply products and services, including network infrastructure equipment manufactured in such countries, and on our sales and results of operations.

Changes in various types of regulations or their application, applicable to current or new technologies or products, may adversely affect our business and results of operations. For example, changes in regulation affecting the construction of base stations and other network infrastructure could adversely affect the timing and costs of new network constructions or the expansion and commercial launch and ultimate commercial success of such networks. Also, changes in applicable privacy-related regulatory frameworks, such as EU General Data Protection Regulation effective as of May 2018, the exit of UK from EU without an agreement on the treatment of personal data, the upcoming eEvidence and e-Privacy Regulations or their application may adversely affect our business, including possible changes that increase costs, limit or restrict possibilities to offer products or services, or reduce or could be seen to reduce the privacy aspects of our offerings. For instance, countries could require governmental interception capabilities or regulations aimed at allowing direct governmental access to data for the products and services we offer that could adversely affect us, if by way of our human rights policy we decide to reduce our sales to such markets or limiting our ability to use components or software that we have developed or sourced from other companies.

Our provision of services and adaptation of cloud-based solutions has resulted in us being exposed to a variety of new regulatory issues or different exposure to regulatory issues (e.g. related to data protection or data localization) and makes us subject to increased regulatory scrutiny. Our current business models rely on certain centralized data processing solutions and cloud or remote delivery-based services for distribution of services and software or data storage. Cloud and remote delivery-based business models and operations have certain inherent risks, including those stemming from potential security and privacy breaches, and applicable regulatory regimes may cause limitations in implementing such business models or expose us to adverse effects stemming for instance from regulatory or contractual issues, including penalties, fines, sanctions and limitations on conducting business. An increase in the protectionist stances of governments around the world, which impact the free flow of data across borders, is already

affecting our global service delivery model.

Reduced availability of export credits supporting our sales as well as reduced government funding for our R&D activities could affect our ability to enter new markets and to develop new technology or products. Furthermore, our business and results of operations may be adversely affected by regulation favoring the local industry participants, as well as other measures with potentially protectionist objectives that host governments in various countries may take, particularly in response to challenging global economic conditions or following changes in political regimes. The impact of changes in or uncertainties related to regulation and trade policies could affect our business and results of operations adversely or indirectly in certain cases where the specific regulations do not directly apply to us or our products and services. Moreover, our competitors have employed and will likely continue to employ significant resources to shape the legal and regulatory regimes in countries where we have significant operations. Governments and regulators may make legal and regulatory changes or interpret and apply existing laws in ways that make our products and services less appealing to end users or require us to incur substantial costs, change our business practices or prevent us from offering our products and services. For example, many countries have adopted new competition laws in recent years. These laws can be applied in ways that favor local suppliers or which are simply unpredictable, creating obstacles to our business activities. Changes in political regimes will also likely impact the way Nokia does business, due to potential changes in trade, privacy, cybersecurity, telecommunications, immigration and environmental policies. Restrictive government policies or actions, such as limitations on visas or work permits for certain foreign workers may make it difficult for us to move our employees into and out of these jurisdictions. Our operations and employee recruitment and retention depend on our ability to obtain the necessary visas and work permits for our employees to travel and work in the jurisdictions in which we operate.

The regulatory, exports and sanctions legal environment can also be difficult to navigate for companies with global operations, impacting our ability to grow business in specific markets or enter new markets. Export control, tariffs or other fees or levies imposed on our products and environmental, health, product safety and data protection, security, consumer protection, money laundering and other regulations that adversely affect the export, import, technical design, pricing or costs of our products could also adversely affect our sales and results of operations. We may be subject to new, existing or tightened export control regulations, sanctions, embargoes or other forms of economic and trade restrictions imposed on certain countries.

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We have a significant presence in emerging markets in which the political, economic, legal and regulatory systems are less predictable than in countries with more developed institutions. These markets represent a significant portion of our total sales, and a significant portion of expected future industry growth. Most of our suppliers are located in, and our products are manufactured and assembled in, emerging markets, particularly in Asia. Our business and investments in emerging markets may also be subject to risks and uncertainties, including unfavorable or unpredictable treatment in relation to tax matters, exchange controls, restrictions affecting our ability to make cross-border transfers of funds, regulatory proceedings, unsound or unethical business practices, challenges in protecting our IPR, nationalization, inflation, currency fluctuations or the absence of or unexpected changes in regulation, as well as other unforeseeable operational risks. The purchasing power of our customers in developing markets depends to a greater extent on the price development of basic commodities and currency fluctuations, which may render our products or services unaffordable.

We continuously monitor international developments and assess the appropriateness of our presence and business in various markets. The US' unilateral withdrawal from the international agreement on Iran's nuclear activities has led to the reimposition of US sanctions while the EU and other signatories remain fully committed to the international agreement relaxing the sanctions against Iran. The diverging EU and US regulatory framework governing business activities in Iran will be far more complex in the future. As a European company it will be quite challenging to reconcile the opposing foreign policy regimes of the US and the EU. The changed US foreign and economic sanctions policy necessitates a reassessment of our operations in Iran which may require us to significantly reduce our business and maintain preexisting contractual commitments in full alignment with applicable economic sanctions.

Also, in recent years, we have witnessed political unrest in various markets in which we conduct business or in which we have operations, which in turn has adversely affected our sales, profitability or operations in these markets, and in certain cases affected us outside these countries or regions. Any reoccurrence or escalation of such unrest could have a further material adverse effect on our sales or results of operations. For instance, instability and conflict in regions such as the Middle East, parts of Africa and Ukraine have in the past adversely affected, and may in the future adversely affect, our business or operations in these or related markets (e.g. through increased economic uncertainty or a slowdown or downturn attributable to current or increased economic and trade sanctions). Should we decide to exit or otherwise alter our presence in a particular market, this may have an adverse effect on us through, for example, triggering investigations, tax audits by authorities, claims by contracting parties or reputational damage. The results and costs of investigations or claims against our international operations may be difficult to predict and could lead to lengthy disputes, fines or fees, indemnities or costly settlements.

Our business and activities cover multiple jurisdictions and are subject to complex regulatory frameworks. We are observing that the adoption of surveillance, data localization, national sourcing and national hiring requirements, regulations and policies are increasing. An increase in regulation of digital telecommunications and the failure by governments to achieve a uniform and reasonable common position on 5G spectrum licensing in various parts of the world, including, especially in the European Union, might impose additional costs or burdens on our customers and on Nokia itself. Current international trends show increased enforcement activity and enforcement initiatives in areas such as competition law, export control and sanctions, privacy, cybersecurity and anti-corruption. Despite our Group-wide annual ethical business training and other measures, we may not be able to prevent breaches of law or governance standards within our business, subsidiaries and joint ventures.

Nokia is a publicly listed company and, as such, subject to various securities and accounting rules and regulations. Nokia must monitor and assess its internal control over financial reporting and its compliance with the applicable rules and regulations. Corporate function's, our operating subsidiaries' or our joint ventures' failure to maintain effective internal controls over financial reporting or to comply with the applicable securities and accounting rules and regulations, could adversely affect the accuracy and timeliness of our financial reporting, which could result, for instance, in loss of confidence in us or in the accuracy and completeness of our financial reports, or otherwise in the

imposition of fines or other regulatory measures, which could have a material adverse effect on us.

Our efforts aimed at managing and improving our competitiveness, financial or operational performance may not lead to targeted results, benefits, cost savings or improvements.

We need to manage our operating expenses and other internal costs to maintain cost efficiency and competitive pricing of our products and services. Failure by us to determine the appropriate prioritization of operating expenses and other costs, to identify and implement the appropriate measures to adjust our operating expenses and other costs on a timely basis, or to maintain achieved cost reduction levels, could have a material adverse effect on our business, results of operations and financial condition.

We operate in highly competitive industries and we are continuously targeting increased efficiency of our operations through various initiatives. For instance, we have announced targeted operating cost and production overheads savings by the end of 2020 and plan these savings come from a wide range of areas, including investments in digitalization to drive more automation and productivity, further process and tool simplification, significant reduction in central support functions to reach best-in-class cost levels, prioritization of R&D programs to best create long-term value, a sharp reduction of R&D in legacy products, driving efficiency from further application of our common software foundation and innovative software development techniques, the consolidation of selected cross-company activities, and further reductions in real estate and other overhead costs. These planned savings are expected to result in a net reduction of employees globally. Also, we may, in the ordinary course of business, institute new plans for restructuring measures. Restructuring measures may be costly, potentially disruptive to operations, and may not lead to sustainable improvements in our overall competitiveness and profitability and, thus, may have a material adverse effect on our business or results of operations, for instance, as a result of the loss of benefits related to economies of scale.

In addition to our efforts in operating cost savings, various efficiency programs aimed at improving cost savings and financial performance have been implemented, and there can be no assurance that such plans will be met as planned in contemplated timeframes or at all, or result in sustainable improvements. Factors that may prevent a successful implementation or cause adverse effects on us include the following:

- § expectations with respect to market growth, customer demand and other trends in the industry in which we operate;
- § our ability to benefit from industry trends may prove to be inaccurate and changes in the general economic conditions, whether globally, nationally or in the markets in which we operate, may impact our ability to implement such plans;

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- § a down-turn in global or regional economic conditions may have an adverse effect on our ability to achieve the cost savings contemplated;
- § legislative constraints or unfavorable changes in legislation in the markets in which we operate may influence timing, costs and expected savings of certain initiatives contemplated;
- § our ability to successfully develop new or improve existing products, market products to new or existing customers, enter new markets and otherwise grow our business in a highly competitive market;
- § our ability to swap equipment of certain customers in line with our future product lines development. We might not be successful in securing continued business from such customers, leading to sunk cost impacting our business and results of operations;
- § organizational changes related to the implementation plans require the alignment and adjustment of resources, systems and tools, including digitalization and automation, which if not completed in a structured manner could impact our ability to achieve our goals, projected cost savings and ability to achieve the efficiencies contemplated;
- § the costs to affect the initiatives contemplated by our plans may exceed our estimates and we may not be able to realize the targeted cash inflows or yield other expected proceeds;
 - § our cost saving initiatives, including R&D, may negatively affect our ability to develop new or improve existing products and compete effectively in certain markets, and there is no guarantee that we will continue to be able to successfully innovate or remain technologically competitive;
- § disruptions to regular business operations caused by the plans, including to unaffected parts of Nokia;
- § intended business plans may require us to inform or consult with employees and labor representatives, and such processes may influence the timing, costs and extent of expected savings and the feasibility of certain of the initiatives contemplated;
- § skilled employees may leave, or we may not be able to recruit employees as a result of planned initiatives, and loss of their expertise may cause adverse effects on our business or limit our ability to achieve our goals and lead to an overall deterioration of brand value among potential and current employees or as a preferred employer; and
- § bargaining power of our suppliers may prevent us from achieving targeted procurement savings.

While we are implementing and have implemented various cost savings and other initiatives in the past, and may implement such initiatives in the future, there can be no assurance that we will be able to complete those successfully or that we will realize the projected benefits. Our plans may be altered in the future, including adjusting any projected financial or other targets. The anticipated costs or the level of disruption expected from implementing such plans or restructurings may be higher than expected.

If we are unable to realize the projected benefits or contemplated cost savings by efforts aimed at managing and improving competitiveness and financial and operational performance, we may experience negative impacts on our reputation or a material adverse effect on our business, financial condition, results of operations and cash flows. Efforts to plan and implement cost saving initiatives may divert management attention from the rest of the business and adversely affect our business.

Due to our global operations, our net sales, costs and results of operations, as well as the U.S. dollar value of our dividends and market price of our ADSs, are affected by exchange rate fluctuations.

We operate globally and are therefore exposed to foreign exchange risks in the form of both transaction risks and translation risks. Our policy is to monitor and hedge exchange rate exposure, and we manage our operations to mitigate, but not to eliminate, the impacts of exchange rate fluctuations. There can be no assurance, however, that our hedging activities will prove successful in mitigating the potentially negative impact of exchange rate fluctuations. Additionally, significant volatility in the relevant exchange rates may increase our hedging costs, as well as limit our ability to hedge our exchange rate exposure. In particular, we may not adequately hedge against unfavorable exchange rate movements, including those of certain emerging market currencies, which could have an adverse effect on our financial condition and results of operations. Furthermore, exchange rate fluctuations may have an adverse effect on our net sales, costs and results of operations, as well as our competitive position, through their impact on our

customers, suppliers and competitors.

We also experience other financial market-related risks, including changes in interest rates and in prices of marketable securities that we own. We may use derivative financial instruments to reduce certain of these risks. If our strategies to reduce such risks are not successful, our financial condition and results of operation may be harmed.

Additionally, exchange rate fluctuations may materially affect the U.S. dollar value of any dividends or other distributions that are paid in euro, as well as the market price of our ADSs.

Our products, services and business models depend on technologies that we have developed as well as technologies that are licensed to us by certain third parties. As a result, evaluating the rights related to the technologies we use or intend to use is increasingly challenging, and we expect to continue to face claims that we have allegedly infringed third parties' IPR. The use of these technologies may also result in increased licensing costs for us, restrictions on our ability to use certain technologies in our products and/or costly and time-consuming litigation.

Our products and services include, and our business models depend on, utilization of numerous patented standardized or proprietary technologies. We invest significantly in R&D through our business to develop new relevant technologies, products and services. Our R&D activities have resulted in us having one of the industry's strongest intellectual property portfolios, on which our products and services and future cash generation and income depend. We believe our innovations that are protected by IPR are a strong competitive advantage for our business. The continued strength of our IPR portfolios depends on our ability to create new relevant technologies, products and services through our R&D activities.

Our products and services include increasingly complex technologies that we have developed or that have been licensed to us by certain third parties. The amount of such proprietary technologies and the number of parties claiming IPR continue to increase. The holders of patents and other

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IPR potentially relevant to these complex technologies may be unknown to us, may have different business models, may refuse to grant licenses to their proprietary rights or may otherwise make it difficult for us to acquire a license on commercially acceptable terms. Additionally, although we endeavor to ensure that we and the companies collaborating with us possess appropriate IPR or licenses, we cannot fully avoid the risks of IPR infringement by suppliers of components, processes and other various layers in our products, or by companies with which we collaborate. Similarly, we and our customers may face claims of infringement in connection with the use of our products.

In line with standard practice in our industry, we generally indemnify our customers for certain intellectual property-related infringement claims initiated by third parties, particularly non-practicing entities having no product or service business, and related to products or services purchased from us. If such claims are made directly against our customers, we may have limited possibilities to participate in the processes including negotiations and defenses, or evaluate the outcomes and resolutions in advance. All IPR indemnifications can result in significant payment obligations for us that are difficult to estimate in advance.

The business models for many areas in our industry may not be clearly established. The lack of availability of licenses for copyrighted content, delayed negotiations or restrictive IPR license terms may have a material adverse effect on the cost or timing of content-related services and products offered by us, mobile network operators or third-party service providers.

Since all technology standards that we use and rely on, including mobile communication technologies such as UMTS, LTE and upcoming 5G, or fixed line communication technologies, include certain IPR, we cannot avoid risks of facing claims for infringement of such rights due to our reliance on such standards. We believe the number of third parties declaring their patents to be potentially relevant to these standards is increasing, which may increase the likelihood that we will be subject to such claims in the future. As the number of market entrants and the complexity of technologies increases, it remains likely that we will need to obtain licenses with respect to existing and new standards from other licensors. While we believe most of such IPR declared or actually found to be essential to a particular standard carries an obligation to be licensed on fair, reasonable and non-discriminatory terms, not all intellectual property owners agree to apply such terms. As a result, we have experienced costly and time-consuming litigation proceedings against us and our customers or suppliers over such issues and we may continue to experience such litigations in the future.

From time to time, certain existing patent licenses may expire or otherwise become subject to renegotiation. The inability to renew or finalize such arrangements or renew licenses with acceptable commercial terms may result in costly and time-consuming litigation, and any adverse result in any such litigation may lead to restrictions on our ability to sell certain products and could result in payments that could potentially have a material adverse effect on our operating results and financial condition. These legal proceedings may continue to be expensive and time-consuming and divert the efforts of our management and technical experts from our business and, if decided against us, could result in restrictions on our ability to sell our products, require us to pay increased licensing fees, unfavorable judgments, costly settlements, fines or other penalties and expenses.

Our patent license agreements may not cover all the future businesses that we may enter, our existing business may not necessarily be covered by our patent license agreements if there are changes in our corporate structure or our subsidiaries, or our newly-acquired businesses may already have patent license agreements with terms that differ from similar terms in our patent license agreements. This may result in increased costs, restrictions in the use of certain technologies or time-consuming and costly disputes whenever there are changes in our corporate structure or our subsidiaries, or whenever we enter into new business areas or acquire new businesses.

We make accruals and provisions to cover our estimated total direct IPR costs for our products. The total direct IPR costs consist of actual payments to licensors, accrued expenses under existing agreements and provisions for potential liabilities. We believe our accruals and provisions are appropriate for all technologies owned by third parties. The ultimate outcome, however, may differ from the provided level, which could have a positive or adverse impact on our results of operations and financial condition.

Any restrictions on our ability to sell our products due to expected or alleged infringements of third-party IPR and any IPR claims, regardless of merit, could result in a material loss of profits, costly litigation, the obligation to pay damages and other compensation, the diversion of the attention of our key employees, product shipment delays or the need for us to develop non-infringing technology or to enter into a licensing agreement on unfavorable commercial terms. If licensing agreements are not available on commercially acceptable terms, we could be precluded from making and selling the affected products, or could face increased licensing costs. As new features are added to our products, we may need to acquire further licenses, including from new and sometimes unidentified owners of intellectual property. The cumulative costs of obtaining any necessary licenses are difficult to predict and may over time have a material adverse effect on our operating results.

We are exposed to risks related to information security. Our business model relies on solutions for distribution of services and software or data storage, which entail inherent risks relating to applicable regulatory regimes, cybersecurity breaches and other unauthorized access to network data or other potential security risks that may adversely affect our business.

Our business and operations rely on confidentiality of proprietary information as well as sensitive information, for instance related to our employees, consumers and our customers. Our business models rely on certain centralized data processing solutions and Cloud or remote delivery-based services for distribution of services and software or data storage, accessible by our partners or subcontractors according to the roles and responsibilities defined.

Although we endeavor to develop products and services that meet the appropriate security standards, including effective data protection, we or our products and online services, marketing and developer sites may be subject to cybersecurity breaches, including hacking, viruses, worms and other malicious software, unauthorized modifications, or illegal activities that may cause potential security risks and other harm to us, our customers or consumers and other end-users of our products and services. IT is rapidly evolving, the techniques used to obtain unauthorized access or sabotage systems change frequently and the parties behind cyber-attacks and other industrial espionage are believed to be sophisticated and have extensive resources, and it is not commercially or technically feasible to mitigate all known vulnerabilities in a timely manner or to eliminate all risk of cyber-attacks and data breaches. Additionally, we contract with multiple third parties in various jurisdictions who collect and use certain data on our behalf. Although we have processes in place designed to ensure appropriate collection, handling and use of such data, third parties may use the data inappropriately or breach laws and agreements in collecting, handling or using or leaking such data. This could lead to lengthy legal proceedings or fines imposed on us, as well as adverse effects to our reputation and brand value. Additionally, cyber-attacks can be difficult to

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prevent, detect or contain. We cannot rule out the possibility that there may have been cyber-attacks that have been successful and/or evaded our detection. We continue to invest in risk mitigating actions; however, there can be no assurance that such investments and actions will prevent or detect future cyber-attacks.

In connection with providing products and services to our customers and consumers, certain customer feedback, information on consumer usage patterns and other personal and consumer data are collected, stored and processed through us, either by us or by our business partners or subcontractors. We have outsourced a significant portion of our IT operations, as well as the network and information systems that we sell to third parties or for whose security and reliability we may otherwise be accountable. Loss, improper disclosure or leakage of any personal or consumer data collected by us or which is available to our partners or subcontractors, made available to us or stored in or through our products, could have a material adverse effect on us and harm our reputation and brand. Additionally, governmental authorities may use our networks products to access the personal data of individuals without our involvement; for example, through the so-called lawful intercept capabilities of network infrastructure, impairing our reputation.

Our business is also vulnerable to theft, fraud or other forms of deception, sabotage and intentional acts of vandalism by third parties and employees. Unauthorized access to or modification, misappropriation or loss of our intellectual property and confidential information, including personal data, could result in litigation and potential liability to customers, suppliers and other third parties, harm our competitive position, reduce the value of our investment in R&D and other strategic initiatives or damage our brand and reputation, which could have a material adverse effect on our business, results of operations or financial condition. Additionally, the cost and operational consequences of implementing further information system protection measures, especially if prescribed by national authorities, could be significant. We may not be successful in implementing such measures in due time, which could cause business disruptions and be more expensive, time consuming and resource-intensive. Such disruptions could adversely impact our business.

Inefficiencies, breaches, malfunctions or disruptions of information technology systems and processes could have a material adverse effect on our business and results of operations. As our business operations, including those we have outsourced, rely on complex IT systems, networks and related services, our reliance on the precautions taken by external companies to ensure the reliability of our and their IT systems, networks and related services is increasing. Consequently, certain disruptions in IT systems and networks affecting our external providers could also have a material adverse effect on our business.

Our operations rely on the efficient and uninterrupted operation of complex and centralized IT systems, networks and processes, which are integrated with those of third parties. All IT systems, networks and processes are potentially vulnerable to damage, breaches, malfunction or interruption from a variety of sources. We are, to a significant extent, relying on third parties for the provision of IT services. We may experience disruptions if our partners do not deliver as expected or if we are unable to successfully manage systems and processes together with our business partners. The ongoing trend to Cloud-based architectures and network function virtualization has introduced further complexity and associated risk.

We are constantly seeking to improve the quality and security of our IT systems. For instance, we have introduced new significant IT solutions in recent years and outsourced certain functions, increasing our dependence on the reliability of external providers as well as the security of communication with them. We will often need to use new service providers and may, due to technical developments or choices regarding technology, increase our reliance on certain new technologies, such as Cloud or remote delivery on demand-based services and certain other services that are used over the internet rather than using a traditional licensing model. Switching to new service providers and introducing new technologies is inherently risky and may expose us to an increased risk of disruptions in our operations, for instance, due to network inefficiency, a cybersecurity breach, malfunctions or other disruptions resulting from IT systems and processes.

We pursue various measures in order to manage our risks related to system and network malfunctions and disruptions, including the use of multiple suppliers and their strong technical and contractual engagements in IT security. However, despite precautions taken by us, any malfunction or disruption of our current or future systems or networks, such as an outage in a telecommunications network used by any of our IT systems, or a breach of our cybersecurity, such as an attack, malware or other event that leads to an unanticipated interruption or malfunction of our IT systems, processes, networks or data leakages, could have a material adverse effect on our business, results of operations and brand value. Additionally, if we fail to successfully secure our IT, this may have a material adverse effect on our business and results of operations. A disruption of services relying on our IT, for instance, could cause significant discontent among users resulting in claims, contractual penalties or deterioration of our brand value.

Our Nokia Technologies business group aims to generate net sales and profitability primarily through licensing of the Nokia patents, technologies and the Nokia brand. We are also engaged with other business ventures including technology innovation and incubation. Expected net sales and profitability for these businesses may not materialize as planned or at all. We may also be subject to liabilities related to our divested Digital Health business.

In addition to patent licensing and monetization, the Nokia Technologies business group generates net sales and profits through business ventures related to Nokia brand and technology licensing.

In 2018, we sold the Digital Health business and focused the Nokia Technologies business group on licensing. Although we divested the Digital Health business and no longer own or control it, the possibility of continuing liabilities remains, be it from the buyer of the business, consumers or other purchasers of digital health products bearing the Nokia name, or regulatory or enforcement bodies seeking to hold Nokia responsible for regulatory or compliance failures relating to the products that occurred on our watch. The outcome of any such claims or proceedings may be difficult to predict and could have a material adverse effect on our financial condition.

Nokia Technologies has a strategic agreement covering branding rights and intellectual property licensing with HMD Global. Refer to “Business overview—Our strategy” and “Business overview—Nokia Technologies” for more information. Under the agreement, Nokia receives royalty payments from HMD Global for sales of Nokia branded mobile phones and tablets, covering both brand and patent licensing. As such, the amount of income and royalty payments for Nokia are dependent on the sales volumes and financial position of HMD Global and HMD Global continuing to make payments to Nokia. In 2018, HMD Global renewed and extended devices in its Nokia-branded mobile phone portfolio. Nokia is also exploring new opportunities to license the brand beyond mobile devices and tablets. There can be no assurance that we will successfully reach additional new

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brand licensing arrangements at all or on terms that prove satisfactory to us. The agreement with HMD Global limits Nokia's possibilities to license the Nokia brand for certain types of devices over an agreed time and as such limiting Nokia's licensing possibilities with respect to such devices.

Additionally, licensing the Nokia brand to HMD Global or to other companies could – in cases where the licensee acts inconsistently with our ethical, compliance or quality standards – negatively affect our reputation and the value of our brand, thus diminishing the business potential with respect to utilizing our brand for licensing opportunities or otherwise having a negative effect on our business. Nokia has limitations in its ability to influence HMD Global in its business and other operations, exposing us to potential adverse effects from the use of the Nokia brand by HMD Global or other adverse developments encountered by HMD Global that become attributable to Nokia through association and HMD Global being a licensee of the Nokia brand.

The industries in which we operate, or may operate in the future, are generally fast-paced, rapidly evolving and innovative. Such industries are at different levels of maturity, and there can be no assurances that any investment we make will yield an expected return or result in the intended benefits. Additionally, we are entering into new business areas based on our technology assets and may explore new business ventures. Such business areas or plans may be adversely affected by adverse industry and market developments in the numerous diverse markets in which we operate, as well as by general economic conditions globally and regionally. As such, the investments may not be profitable or achieve the targeted rates of return.

There can be no assurances that our Nokia Technologies business group will be successful in innovation and incubation or in generating net sales and profits through its business plans, for instance in technology and brand licensing.

We operate in many jurisdictions around the world, and we are subject to various legal frameworks regulating corruption, fraud, trade policies, and other risk areas. At any given time, we may be subject to inspections, investigations, claims, and government proceedings, and the extent and outcome of such proceedings may be difficult to estimate with any certainty. We may be subject to material fines, penalties and other sanctions as a result of such investigations.

Bribery and anti-corruption laws in effect in many countries prohibit companies and their intermediaries from making improper payments to public officials for the purpose of obtaining new business or maintaining existing business relationships. Certain anti-corruption laws such as the United States Foreign Corrupt Practices Act (FCPA) also require the maintenance of proper books and records, and the implementation of controls and procedures in order to ensure that a company's operations do not involve corrupt payments. Since we operate throughout the world, and given that some of our customers are government-owned entities and that our projects and agreements often require approvals from public officials, there is a risk that our employees, suppliers, consultants or commercial third party representatives may take actions that are in violation of our policies and of applicable anti-corruption laws.

In many parts of the world where we currently operate or seek to expand our business, local practices and customs may be inconsistent with our policies, including the Nokia Code of Conduct, and could violate anti-corruption laws, including the FCPA and the UK Bribery Act 2010, and applicable European Union regulations, as well as applicable economic sanctions and embargoes. Our employees, or other parties acting on our behalf, could violate policies and procedures intended to promote compliance with anti-corruption laws or economic sanctions. Violations of these laws by our employees or other parties acting on our behalf, regardless of whether we had participated in such acts or had knowledge of such acts at certain levels within our organization, could result in us or our employees becoming subject to criminal or civil enforcement actions, including fines or penalties, disgorgement of profits and suspension or disqualification of sales. Additionally, violations of law or allegations of violations may result in reputational harm and loss of business and adversely affect our brand and reputation. Detecting, investigating and resolving such

situations may also result in significant costs, including the need to engage external advisers, and consume significant time, attention and resources from our management and other key employees. The results and costs of such investigations or claims may be difficult to predict and could lead to, for instance, lengthy disputes, fines, fees or indemnities, costly settlement or the deterioration of the Nokia brand.

With the acquisition of Alcatel Lucent, any historical issues with Alcatel Lucent's operations may be attributed to or the responsibility of Nokia. In the past, Alcatel Lucent has experienced both actual and alleged violations of anti-corruption laws. As a result of FCPA violations in the past, Alcatel Lucent had to pay substantial amounts in fines, penalties and disgorgement of profits to government enforcement agencies in the United States and elsewhere. We may be subject to claims, fines, investigations or assessments for conduct that we failed to or were unable to discover or identify in the course of performing our due diligence investigations of Alcatel Lucent, including unknown or unasserted liabilities and issues relating to fraud, trade compliance, non-compliance with applicable laws and regulations, improper accounting policies or other improper activities.

Any damages, fines, penalties or other sanctions or consequences attributable to us could have a material adverse effect on our brand, reputation or financial position.

We may be adversely affected by developments with respect to customer financing or extended payment terms that we provide our customers.

Mobile operators in certain markets may require their suppliers, including us, to arrange, facilitate or provide financing in order to obtain sales or business. Similarly, operators may require extended payment terms. In certain cases, the amounts and duration of these financings and trade credits, and the associated impact on our working capital, may be significant. Requests for customer financing and extended payment terms are typical for our industry.

Uncertainty in the financial markets may result in increased customer financing requests. As a strategic marketing requirement, we arrange and facilitate financing or provide extended payment terms to a number of our customers, typically supported by export credit agencies or through the sale of related deferred receivables. In the event, that export credit agencies face future constraints on their ability or willingness to provide financing to our customers, or there is insufficient demand to purchase their receivables, such events could have a material adverse effect on our business and financial condition. We have agreed to extended payment terms for a number of our customers, and may continue to do so in the future. Extended payment terms may result in a material aggregate amount of trade credits. Even when the associated risk is mitigated by a diversified customer portfolio, defaults in the aggregate could have a material adverse effect on us.

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We cannot guarantee that we will be successful in arranging, facilitating or providing required financing, including extended payment terms to our customers, particularly in difficult financial conditions on the market. Additionally, certain of our competitors may have greater access to credit financing, which could adversely affect our ability to compete successfully for business opportunities in the markets in which we operate. Our ability to manage our total customer financing and trade credit exposure depends on a number of factors, including capital structure, market conditions affecting our customers, the levels and terms of credit available to us and our customers, the cooperation of export credit agencies and our ability to mitigate exposure on acceptable terms. We may be unsuccessful in managing the challenges associated with the customer financing and trade credit exposure that we may face from time to time. While defaults under financings, guarantees and trade credits to our customers resulting in impairment charges and credit losses have not been significant for us in the past, these may increase in the future, and commercial banks may not continue to be able or willing to provide sufficient long-term financing, even if backed by export credit agency guarantees, due to their own constraints.

We have sold certain receivables to banks or other financial institutions to mitigate the payment risk and improve our liquidity, and any significant change in our ability to continue this practice could impair our capability to mitigate such payment risk and to manage our liquidity.

We may not be able to collect outstanding guarantees and bonds that could limit our possibilities to issue new guarantees and/or bonds, which are required in customer agreements or practices. We also face risks that such commercial guarantees and bonds may be unfairly called.

We have operations in many countries with different tax laws and rules, which may result in complex tax issues and disputes.

Taxation or other fees collected by governments or governmental agencies may result in unexpected payment obligations, and in response to prevailing difficult economic conditions in the public sector, coupled with fundamental changes in international tax regulations, there may be an increased aggressiveness in collecting such fees. We may be obliged to pay additional taxes for past periods as a result of changes in law, or changes of tax authority practice or interpretation (possibly with retroactive effect in certain cases), resulting potentially in a material adverse effect on our cash flow and financial position. Our business and activities cover multiple jurisdictions and are subject to complex tax laws and rules as well as diverse tax authority practices and interpretations. Despite our governance and compliance procedures, there might be unintended consequences from changes in interpretation of complex tax regulations or retroactive implications in tax reforms to our business, subsidiaries and joint ventures. For instance, the U.S. government passed a comprehensive set of tax reforms in 2017 that impact many multinational businesses, including ours. The U.S. tax authority continues to issue regulatory guidance on many of these reforms, and interpretation of the reform package's provisions is likewise on-going. Such regulatory guidance or new interpretations may have an unfavorable impact on us. As a company with global operations we are subject to tax investigations in various jurisdictions, and such proceedings can be lengthy, involve actions that can hinder local operations and affect unrelated parts of our business, and the outcome of such proceedings is difficult to predict. While we have made provisions for certain tax issues, the provisions we have made may not be adequate to cover such increases.

The taxes for which we make provisions, such as income taxes, indirect taxes and social taxes, could increase significantly in the future as a result of changes in applicable tax laws or global guidance in the area of transfer pricing in the countries in which we operate. Our business and the investments we make globally, especially in emerging markets, are subject to uncertainties, including unfavorable or unpredictable changes in tax laws (possibly with retroactive effect in certain cases), taxation treatment and regulatory proceedings, including tax audits. The impact of these factors is dependent on the types of revenue and mix of profit we generate in various countries, for instance, income from sales of products or services may have different tax treatments.

We may face adverse tax consequences due to our past acquisitions and divestments, including, but not limited to, stamp duties, land transfer taxes, franchise taxes and other levies. Additionally, there may be other potential tax liabilities which we are not currently aware of but which may result in significant tax consequences now or in the future.

In the context of our sale of D&S business to Microsoft, we are required to indemnify Microsoft for certain tax liabilities, including (i) tax liabilities of the Nokia entities acquired by Microsoft in connection with the closing of the sale of D&S business, (ii) tax liabilities associated with the assets acquired by Microsoft and attributable to tax periods ending on or prior to the closing date of the sale of D&S business, and (iii) tax liabilities relating to the pre-closing portion of any taxable period that includes the closing date of the sale of D&S business.

There may also be unforeseen tax expenses that turn out to have an unfavorable impact on us. As a result, and given the inherently unpredictable nature of taxation, there can be no assurance that our tax rate will remain at the current level or that cash flows regarding taxes will be stable.

Our actual or anticipated performance, among other factors, could reduce our ability to utilize our deferred tax assets.

Deferred tax assets recognized on tax losses, unused tax credits and tax deductible temporary differences are dependent on our ability to offset such items against future taxable income within the relevant tax jurisdiction. Such deferred tax assets are also based on our assumptions on future taxable earnings and these may not be realized as expected, which may cause the deferred tax assets to be materially reduced. There can be no assurances that an unexpected reduction in deferred tax assets will not occur. Any such reduction could have a material adverse effect on us. Additionally, our earnings have in the past been and may in the future continue to be unfavorably affected in the event that no tax benefits are recognized for certain deferred tax items.

We may be unable to retain, motivate, develop and recruit appropriately skilled employees or may fail in workforce balancing.

Our success is dependent on our ability to retain, motivate, develop and recruit appropriately skilled employees. The market for skilled employees and leaders in our business is extremely competitive. We continuously work on developing a corporate culture that is motivational, based on equal opportunities and encourages creativity and continuous learning to meet the challenges.

Our workforce has fluctuated over recent years as we have introduced changes in our strategy to respond to our business targets and endeavors. Such changes and uncertainty have caused and may in the future cause disruption and dissatisfaction among employees, as well as fatigue due to the cumulative effect of several reorganizations over the past years, our efforts to continue to evolve our business, and maximize operational efficiency. These efforts might include implementing new organizational structures such as reorganization, strategic changes, M&A activity, competence development, relocation of employees, the closing or consolidation of sites, or insourcing/outourcing parts of the business operations. As a result, employee motivation, energy, focus, morale and productivity may be reduced, causing inefficiencies and other problems across the

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organization resulting in the loss of key employees and increased costs in resolving and addressing such matters. The loss of key employees could result in resource gaps, some of which may only be noticed after a certain period of time or which negatively impact our relationship with customers, vendors or other business partners. Accordingly, we may need to take measures to attract, retain and motivate skilled employees.

Succession planning, especially with respect to key employees and leaders, is crucial to avoid business disruptions and to ensure the appropriate transfer of knowledge. We have, and may from time to time, acquire businesses or complete other transactions where retaining key employees may be crucial to obtain the intended benefits of such transactions. We must ensure that key employees of such acquired businesses are retained and appropriately motivated. However, there can be no assurances that we will be able to implement measures successfully to retain or hire the required employees. We believe this will require significant time, attention and resources from our senior management and other key employees within our organization and may result in increased costs. We have encountered, and may in the future encounter, shortages of appropriately skilled employees or lose key employees or senior management, which may hamper our ability to implement our strategies and may have a material adverse effect on our business and results of operations.

Having skillful, motivated people in the right places is a key factor for the success of our strategy. However, we may fail in our efforts to rebalance our workforce as planned and may result in larger than expected costs, or we may not be able to complete such efforts, for instance, due to legal restrictions, resulting in a non-optimal workforce that could hinder our ability to reach targeted cost savings. Relationships with employee representatives are generally managed at the site level in accordance with country-specific legislation and most collective bargaining agreements have been in place for several years. Our inability to negotiate successfully with employee representatives or failures in our relationships with such representatives could result in strikes by the employees, increased operating costs as a result of higher wages or benefits paid to employees as the result of such strike or other industrial action or inability to implement changes to our organization and operational structure in the planned timeframe or expense level, or at all. If our employees were to engage in a strike or other work stoppage, we could experience a significant disruption in our day-to-day operations and higher ongoing labor costs, which could have a material adverse effect on our business and results of operations.

We may face problems or disruptions in our manufacturing, service creation, delivery, logistics or supply chain. Additionally, adverse events may have a profound impact on production sites or the production sites of our suppliers, which are geographically concentrated.

Our product manufacturing, service creation and delivery, as well as our logistics, or the components of such activities that we have outsourced to third parties, expose us to various risks and potential liabilities, including those related to compliance with laws and regulations, exposure to environmental liabilities or other claims and vulnerability to adverse natural or man-made disasters. Also, our dependence on third-party suppliers has increased as a result of our strategic decisions to outsource certain activities. Additionally, if we are subjected to negative publicity with respect to the activities that we manage or that are managed by third parties, we may experience an adverse impact to our reputation that can have a negative effect, for instance, on our brand and sales. These operations are continuously monitored and modified in an effort to improve the efficiency and flexibility of our manufacturing, service creation and delivery, as well as our logistics function and ability to produce, create and distribute continuously changing volumes. We, or third parties that we outsource services to, may experience difficulties in adapting our supply to meet the changing demand for our products and services, ramping up and down production at our facilities, adjusting our network implementation capabilities as needed on a timely basis, maintaining an optimal inventory level, adopting new manufacturing processes, finding the most timely way to develop the best technical solutions for new products, managing the increasingly complex manufacturing process, service creation and delivery process or achieving required efficiencies and flexibility.

Our manufacturing operations depend on obtaining sufficient quantities of fully functional products, components, sub-assemblies, software and services on a timely basis. Our principal supply requirements for our products are for electronic components, mechanical components and software, which all have a wide range of applications in our products. In certain cases, a particular component or service may be available only from a limited number of suppliers or from a single supplier in the supply chain. Suppliers may from time to time extend lead times, limit supplies, change their partner preferences, increase prices, provide poor quality supplies or be unable to adapt to changes in demand due to capacity constraints or other factors, which could adversely affect our ability to deliver our products and services on a timely basis. For example, our efforts to meet our customer needs during major network roll-outs in certain markets may require sourcing large volumes of components and services from suppliers and vendors at short notice and at the same time with our competitors. If we fail to properly anticipate customer demand, an over-supply or under-supply of components and production or services delivery capacity could occur. In many cases, some of our competitors utilize the same contract manufacturers, component suppliers and service vendors. If they have purchased capacity or components ahead of us, or if there is significant consolidation in the relevant supplier base, this could prevent us from acquiring the required components or services, which could limit our ability to supply our customers or increase our costs.

Our suppliers or a supplier may fail to meet our supplier requirements, such as our and our customers' product quality, safety, security and other standards. Certain suppliers may not comply with local laws, including, among others, local labor laws. Consequently, some of our products may be unacceptable to us or to our customers. Our products are highly complex and defects in their design, manufacture and associated hardware, software and content have occurred in the past and may continue to occur in the future. Defects and other quality issues may result from, among other things, failure in our own product manufacturing and service creation and delivery, as well as failure of our suppliers to comply with our requirements, or failures in products and services created jointly with business partners or other third parties where the development and manufacturing process is not fully within our control. Quality issues may cause, for instance, delays in deliveries, loss of intellectual property, liabilities for network outages, court fees and fines due to breaches of significantly increasing regulatory privacy requirements and related negative publicity, and additional repair, product replacement or warranty costs to us, and harm our reputation and our ability to sustain or obtain business with our current and potential customers. With respect to our services, quality issues may relate to the challenges of having the services fully operational at the time they are made available to our customers and maintaining them on an ongoing basis. We may also be subject to damages due to product liability claims arising from defective products and components. We make provisions to cover our estimated warranty costs for our products and pending liability claims. We believe our provisions are appropriate, although the ultimate outcome may differ from the provisions that are provided for, which could have a material adverse effect on our results of operations, particularly profitability and financial condition.

We may experience challenges caused by third parties, or other external difficulties in connection with our efforts to modify our operations to improve the efficiency and flexibility of our manufacturing, service creation and delivery, as well as our logistics, including, but not limited to, strikes,

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purchasing boycotts, public harm to our brand and claims for compensation resulting from our decisions on where to place and how to utilize our manufacturing facilities. Such difficulties may result from, among other things, delays in adjusting production at our facilities, delays in expanding production capacity, failures in our manufacturing, service creation and delivery, as well as logistics processes, failures in the activities we have outsourced, and interruptions in the data communication systems that run our operations. Any of these events could delay our successful and timely delivery of products that meet our and our customers' quality, safety, security and other requirements, cause delivery of insufficient or excess volumes compared to our own estimates or customer requirements, or otherwise have a material adverse effect on our sales and results of operations or our reputation and brand value.

Many of our production sites or the production sites of our suppliers are geographically concentrated, with a majority of our suppliers based in Asia. We rely on efficient logistic chain elements, such as regional distribution hubs or transport chain elements (main ports, streets, and airways). In the event that any of these geographic areas are affected by any adverse conditions, such as severe impacts of climate change or other environmental events, natural or man-made disasters, geopolitical disruptions, civil unrest or health crises that disrupt production or deliveries from our suppliers, our ability to deliver our products on a timely basis could be adversely affected, which may have a material adverse effect on our business and results of operations.

An unfavorable outcome of litigation, arbitrations, agreement-related disputes or product liability-related allegations against our business could have a material adverse effect on us.

We are a party to lawsuits, arbitrations, agreement-related disputes and product liability-related allegations in the normal course of our business. Litigation, arbitration or agreement-related disputes can be expensive, lengthy and disruptive to normal business operations and divert the efforts of our management. Moreover, the outcomes of complex legal proceedings or agreement-related disputes are difficult to predict. An unfavorable resolution of a particular lawsuit, arbitration or agreement-related dispute could have a material adverse effect on our business, results of operations, financial condition and reputation. The investment or acquisition decisions we make may subject us to litigation arising from minority shareholders' actions and investor dissatisfaction with the activities of our business. Shareholder disputes, if resolved against us, could have a material adverse effect on our financial condition and results of operations as well as expose us to disputes or litigation.

We record provisions for pending claims when we determine that an unfavorable outcome is likely and the loss can reasonably be estimated. Due to the inherent uncertain nature of legal proceedings, the ultimate outcome or actual cost of settlement may materially differ from estimates. We believe our provisions for pending claims are appropriate. The ultimate outcome, however, may differ from the provided estimate, which could have either a positive or an adverse impact on our results of operations and financial condition.

Although our products are designed to meet all relevant safety standards and other recommendations and regulatory requirements globally, we cannot guarantee we will not become subject to product liability claims or be held liable for such claims or be required to comply with future regulatory changes in this area, which could have a material adverse effect on our business and financial condition. We have been involved in several lawsuits alleging adverse health effects associated with our products, including those caused by electromagnetic fields, and the outcome of such procedures is difficult to predict, including potentially significant fines or settlements. Even a perceived risk of adverse health effects of mobile devices or base stations could have a material adverse effect on us through a reduction in the demand for mobile devices having an adverse effect, for instance, through a decreased demand for mobile networks or increased difficulty in obtaining sites for base stations.

For a more detailed discussion of litigation to which we are a party, refer to Note 29, Provisions, of our consolidated financial statements included in this annual report on Form 20-F.

We may not have access to sources of funding on favorable terms, or at all.

We rely on multiple sources of funding for short-term and long-term capital and aim to minimize the liquidity risk by maintaining a sufficient cash position and having committed credit lines in place. However, there can be no assurances that we will be able to generate sufficient amounts of capital or to maintain an efficient capital structure from time to time.

We also may not be able to have access to additional sources of funds that we may need from time to time with reasonable terms, or at all. If we cannot access capital on a commercially viable basis, our business, financial condition and cash flow could materially suffer.

We may not be able to re-establish investment grade rating or maintain our credit ratings.

Moody's, Standard & Poor's and other credit rating agencies have assigned credit ratings to us and we have set a goal of re-establishing investment grade credit rating. There can be no assurances that we will be able achieve an investment grade credit rating.

In the event our credit rating is downgraded, it could have a material adverse effect, for instance, on our cost of funds and related margins, our business and results of operations, financial condition, liquidity, or access to capital markets.

We may be unable to successfully implement planned transactions or transactions may result in liabilities. We may be unable to realize the anticipated benefits, synergies, cost savings or efficiencies from acquisitions, and we may encounter issues or inefficiencies related to our organizational and operational structure, including being unable to successfully implement our business plans.

From time to time, we may consider possible transactions that could complement our existing operations and enable us to grow our business or shift focus via divest of our existing businesses or operations. We have made a number of acquisitions and divestments, in addition to the recent acquisitions of SpaceTime Insight and Unium and divestment of Digital Health business. We may engage in further transactions, such as acquisitions, divestments, mergers or joint ventures in the future. Additionally, we make investments to companies through certain investment funds, including NGP Capital. There can be no assurance that these transactions will be successful or yield expected benefits and results or that investments will result in new successful technologies that we will be able to monetize.

We cannot provide any assurances that any transaction we initiate, will ultimately be completed on favorable terms or provide the benefits or return on investment that we had originally anticipated. After reaching an agreement for a transaction, we may need to satisfy pre-closing conditions on acceptable terms, which may prevent us from completing the transaction or result in changes to the scope of the transaction. Furthermore, the assumptions may be incorrect in evaluating a transaction. Therefore, we may be exposed to unknown, larger or contingent liabilities of acquired

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businesses, such as those related to contractual obligations, taxes, pensions, environmental liabilities, disputes and compliance matters. Additionally, there are multiple risks that can hamper or delay a transaction, including;

- § unanticipated delays or inability to proceed with transactions as planned, for instance, due to issues in obtaining regulatory or shareholder approvals, completing public offers or proposals, the imposition of conditions on the acquirer of a business to divest certain assets or impose other obligations due to competition laws or other regulations;
- § unanticipated costs or changes in scope, for instance, due to issues with regulators or courts imposing terms on a transaction or obstacles that result in changes required in the scope of the transaction;
- § the potential loss of key employees, customers and suppliers;
- § unanticipated changes in business, industry or general economic conditions that affect the assumptions underlying the acquisition;
- § potential disputes with sellers, purchasers or other counterparties;
- § impairments related to goodwill and other intangible assets, for instance, due to business performance after an acquisition or differences in evaluating the goodwill with respect to the acquired businesses;
- § potential limitations on our ability to control any joint ventures; accordingly, such transactions may result in increased exposure to operational, compliance, legal or financial risks;
- § unexpected costs associated with the separation of the business which is to be divested or with the integration of the business which is acquired;
- § additional payment obligations and higher costs resulting from non-performance by divested businesses;
- § exposure to contingent liabilities in connection with any indemnity we provide to the purchaser in connection with such divestment;
- § potential post-closing claims for indemnification and disputes with purchasers or sellers;
- § our dependence on some of the divested businesses as our suppliers in the future; and
- § high transaction costs.

Significant transactions may result in claims between the parties, (including, but not limited to, any indemnification claims), which can consume time and management attention, and the outcome of any claims related to significant transactions may be difficult to predict and could have a material adverse effect on our financial condition.

The level of effort required for successful integration depends on the complexity of the acquired business. Integration process involves certain risks and uncertainties, some of which are outside our control, and there can be no assurance that we will be able to realize the intended organizational and operational benefits and potentially targeted cost savings related to our business plans in the manner or within the timeframe currently anticipated. Such risks and uncertainties include, among others, the distraction of our management's attention from our business resulting in performance shortfalls, the disruption of our ongoing business, interference with our ability to maintain our relationships with customers, vendors, regulators and employees and inconsistencies in our services, standards, quality, product road maps, controls, procedures and policies, any of which could have a material adverse effect on our business, financial condition and results of operations.

Potential challenges related to acquisitions that we may encounter regarding the integration process and operations, include the following:

- § adverse contractual issues with respect to various agreements with third parties (including joint venture agreements, customers, vendors, licensees or other contractual parties), certain financing facilities, pension fund agreements, agreements for the performance of engineering and related work/services, IT agreements, technology, intellectual property rights and licenses, employment agreements, or pension and other post-retirement benefits-related liability issues;
- § disruptions caused, for instance, by reorganizations, which may result in inefficiency within the new organization through loss of key employees or delays in implementing our intended structural changes, among other issues;

- § inability to achieve the targeted organizational changes, efficiencies or synergies in the targeted time or to the extent targeted or with targeted implementation costs, for instance due to inability to streamline overlapping products and services efficiently, rationalize our organization and overheads, reduce overheads and costs or achieve targeted efficiencies, and the risk of new and additional costs associated with implementing such changes;
- § inability to rationalize or streamline our organization or product lines or to retire legacy products and related services as a result of pre-existing customer commitments;
- § loss of, or lower volume of, business from key customers, or the inability to renew agreements with existing customers or establish new customer relationships, including limitations linked to customer policies with respect to aggregate vendor share or supplier diversity policies or increased efforts from competitors aiming to capitalize on disruptions;
- § conditions and burdens imposed by laws, regulators or industry standards on our business or adverse regulatory or industry developments or litigation affecting us, as a result of the acquisition of Alcatel Lucent or otherwise;
 - § issues relating to fraud, non-compliance with applicable laws and regulations, improper accounting policies, improper internal control or other improper activities;

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- § challenges relating to the consolidation or ongoing integration of corporate, financial data and reporting, control and administrative functions, including cash management, foreign exchange/hedging operations, internal and other financing, insurance, financial control and reporting, IT, communications, legal and compliance and other administrative functions;
- § the coordination of R&D, marketing and other support functions may fail or cause inefficiencies or other administrative burdens caused by operating the combined business; and
- § our ability to eliminate the complexity of our corporate structure following the acquisition.

During the course of the ongoing integration process, we have been made aware of certain practices relating to compliance issues at the former Alcatel Lucent business that have raised concerns. We have initiated an internal investigation and voluntarily reported the matter to the relevant regulatory authorities, with whom we are cooperating with a view to resolving the matter. The resolution of this matter could result in potential criminal or civil penalties, including the possibility of monetary fines, which could have a material adverse effect on our business, brand, reputation or financial position.

Additionally, the anticipated cost reductions and other benefits expected to arise from the acquisitions and integration of businesses, as well as related costs to implement such measures, are derived from our estimates, which are uncertain. The underlying assumptions are inherently uncertain and subject to a variety of significant business, economic, and competitive factors, risks and uncertainties that could cause our actual results to differ materially from those contained in the expected synergy benefits and related cost estimates.

We are involved in joint ventures and are exposed to risks inherent to companies under joint management.

We have a number of joint ventures in various parts of the world. The agreements related to our joint ventures may require unanimous consent or the affirmative vote of a qualified majority of the shareholders to take certain actions, thereby possibly slowing down the decision-making process. In addition, joint venture companies involve inherent risks such as those associated with a complex corporate governance structure, including lack of transparency and consequent risks of compliance breaches or other similar issues, or issues in dissolving such entities or divesting their shareholdings, assets and liabilities, and also may involve negative public perceptions caused by the joint venture partner that are adverse to us.

Performance failures of our partners, as well as failures to agree to partnering arrangements with third parties could adversely affect us.

If any of the companies we partner and collaborate with were to fail to perform as expected, or if we fail to achieve the collaboration or partnering arrangements needed to succeed, we may be unable to bring our products, services or technologies to market successfully or in a timely manner, which could have a material adverse effect on our operations. We are increasingly collaborating and partnering with third parties to develop technologies, products and services, as well as seeking new revenue streams through partnering arrangements. We also depend on third-party partners in our efforts to monetize our brands, including the Nokia and Nokia Bell Labs brands and technologies, for instance, through arrangements where the brands are licensed to third-party products and the product development and distribution are handled partly or in full by third parties. Additionally, we have outsourced various functions to third parties and are relying on them to provide certain services to us. These arrangements involve the commitment of certain resources, including technology, R&D, services and employees. Although the objective of the collaborative and partnering arrangements is a mutually beneficial outcome for each party, our ability to introduce and provide products and services that are commercially viable and meet our, our customers' and consumers' quality, safety, security and other standards in a timely manner could be hampered from performance or other failures. For instance, if a partner acts inconsistently with our ethical, sustainability, compliance, brand, or quality standards, this can negatively affect our reputation, the value of our brand, and the business outcome of our partnerships.

In many areas, including IT, finance and human resources-related arrangements, a failure to maintain an efficient relationship with the selected partner may lead to ongoing operational problems or even to severe business disruptions, and we cannot give assurances that the availability of the processes and services upon which we rely on will not be interrupted, which could have a material adverse effect on our business operations. Performance problems may result in missed reporting deadlines, financial losses, missed business opportunities and reputational harm. In addition, as management's focus shifts from a direct to an indirect operational control in these areas, there is a risk that without active management and monitoring of the relationship, the services provided may be below appropriate quality standards. Partners may not meet agreed service levels, in which case, depending on the impacted service, our contractual remedies may not fully cure all of the damages we may suffer. This is particularly true for any deficiencies that would impact the reporting requirements applicable to us as a company listed on multiple stock exchanges.

In order to implement outsourcing arrangements, we may be required to implement changes in our business practices and processes, for instance, to capture economies of scale and operational efficiencies, and to reflect a different way of doing business. Consequently, business processes that were customized for individual business groups or for us generally may be converted to a more standardized format. During a transition to outsourcing, our employees may need to train the partner's staff or be trained in the partners' systems, potentially resulting in the distraction of our employees. Adjustments to staff size and transfer of employees to the partner's companies could have an adverse effect on us, for instance, through impacting the morale of our employees and raising complex labor law issues and resulting in the loss of key personnel. Additionally, partnering and outsourcing arrangements can create a dependency on the outsourcing company, causing issues in our ability to learn from day-to-day responsibilities, gain hands-on experience and adapt to changing business needs. Concerns could equally arise from giving third parties access to confidential data, strategic technology applications and books and records. There is also a risk that we may not be able to determine whether controls have been effectively implemented, and whether the partner company's performance monitoring reports are accurate.

The carrying amount of our goodwill may not be recoverable.

We assess the carrying amount of goodwill annually, or more frequently if events or changes in circumstances indicate that such carrying amount may not be recoverable. We assess the carrying amount of other identifiable assets if events or changes in circumstances indicate that their carrying amounts may not be recoverable. If we do not generate revenues from our businesses as anticipated, our businesses may not generate sufficient positive operating cash flows. This, or other factors, may lead to a decrease in the value of our assets, including intangible assets and the goodwill attributed to our businesses, resulting in impairment charges that may adversely affect our net profit for the year. While we believe the estimated recoverable values are reasonable, actual performance in the short- and long-term and our assumptions on which we base our calculations could materially differ from our forecasts, which could impact future estimates of our businesses' recoverable values, and may result in impairment charges.

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The amount of dividend and equity return distributed to shareholders for each financial period is uncertain.

We cannot assure that we will pay dividends or deliver return on equity on the shares issued by us, nor is there any assurance as to the amount of any dividend or return of equity we may pay, including but not limited to situations where we make commitments to increase our dividends. The payment and the amount of any dividend or return of equity is subject to the discretion of our Board and, ultimately, the general meeting of our shareholders and will depend on available cash balances, retained earnings, anticipated cash needs, the results of our operations and our financial condition and terms of outstanding indebtedness, as well as other relevant factors such as restrictions, prohibitions or limitations imposed by applicable law.

We are exposed to pension, employee fund-related and employee healthcare-related risks and we may be unsuccessful in our ability to avoid or control costs resulting from a need for increased funding.

We are exposed to various employee cost-related risks, including those related to pension, employee fund-related obligations and employee healthcare-related risks. In the United States, we maintain significant employee pension benefit plans and a significant retiree welfare benefit plan (providing post-retirement healthcare benefits and post-retirement life insurance coverage). Outside the United States, we contribute to pension schemes for large numbers of current and former employees. The U.S. and non-U.S. plans and schemes have funding requirements that depend on, among other things, various legal requirements, how assets set aside to pay for those obligations are invested, the performance of financial markets, interest rates, assumptions regarding the life expectancy of covered employees and retirees, and medical cost inflation and medical care utilization. To the extent that any of those variables change, the funding required for those plans/schemes may increase, and we may be unsuccessful in our ability to avoid or control costs resulting from such increased funding requirements. Our inability to avoid or control such costs could have a material adverse effect on our results of operations and our financial position.

With respect to our employee costs and pension and other post-retirement obligations, we face the following risks, among others:

- § financial market performance and volatility in asset values and discount rates affect the funded status of our pension obligations and could increase funding requirements, including legally required minimum contributions;
- § our pension plan participants and post-retirement health plan participants may live longer than has been assumed, which would result in an increase in our benefit obligations. We cannot be certain that the longevity of the participants in our pension plans or retiree healthcare plan will not exceed that indicated by the mortality tables we currently use or that future updates to those tables will not reflect materially longer life expectancies;
- § we currently fund, and expect to be able to continue to fund, our United States post-retirement healthcare and group life insurance costs for our formerly represented retirees with excess pension assets in our (United States) formerly represented pension plan, as permitted under Section 420 of the United States Internal Revenue Code. A deterioration in the funded status of that pension plan could negatively affect our ability to continue making Section 420 transfers. Section 420 is currently set to expire in 2025.
- § we currently provide post-retirement group life insurance coverage for a closed group of former non-represented employees who meet stated age and service criteria. This benefit obligation is largely insured through an experience-rated group life insurance policy issued by a reputable insurer, the premiums for which are paid from a voluntary employees' beneficiary association (veba) trust. Based on current actuarial and return-on-asset assumptions and the present level and structure of this group life insurance obligation, we believe that we can continue to fund the premiums for this policy from this trust for several more years. Once the trust's assets are depleted, however, the company will bear the annual premium cost associated with this benefit. Although we expect to be able, in the future, to fund this cost from excess pension assets in our (United States) non-represented pension plan, the level of excess pension assets in that plan in any given year may be insufficient to cover the annual premium cost.

We engage in the installation and maintenance of undersea telecommunications cable networks, and in the course of this activity we may cause damage to existing undersea infrastructure, for which we may ultimately be held responsible.

We engage in the supply of submarine optical fiber cable networks linking mainland to islands, island to island or several points along a coast, with activities also expanding to the supply of broadband infrastructure to oil and gas platforms and other offshore installations. Although thorough surveys, permit processes and safety procedures are implemented during the planning and deployment phases of all of these activities, there is a risk that previously-laid infrastructure, such as electric cables or oil pipelines, may go undetected despite such precautions, and be damaged during the process of laying the telecommunications cable, potentially causing business interruption to third parties operating in the same area and accidental pollution or other disturbances or damage to the environment. While we have contractual limitations in place and maintain insurance coverage to limit our exposure, we cannot provide any assurance that these protections will be sufficient to cover such exposure entirely.

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Corporate governance statement

This corporate governance statement is prepared in accordance with Chapter 7, Section 7 of the Finnish Securities Markets Act (2012/746, as amended) and the Finnish Corporate Governance Code 2015 (the “Finnish Corporate Governance Code”).

Introduction

In 2018, we continued on delivering on Nokia’s commitment to strong corporate governance and related practices. To do that, the Board activities were structured to develop the Company’s strategy and to enable the Board to support the management on the delivery of it within a transparent governance framework. In addition to regular business and financial updates at each Board meeting, the table below sets out a high-level overview of the key areas of focus for the Board’s and its Committee’s activities during the year.

	January	March	April	May	July	October	November
Board	Approval of the long-range and annual plans	Strategy update		Corporate strategy and strategy use cases review	Customer Operations and business group strategy execution update	Annual strategy meeting	Corporate and detailed business group strategy recapitulation
	Group key risks	Approval of financial statements		Past M&A cases	Bond refinancing	Talent development and leadership succession	IT and Security
	Capital structure	AGM proposals and convening of the AGM		Corporate responsibility	Privacy		
	AI strategy	Talent development and leadership succession		Appointment of the Chairs and Committees			
	Strategic deep-dive into a business units			Establishment of Technology Committee			
	Privacy						
	Compliance and litigation						
	Equity programs						
	Board evaluation						
CGN Committee	Board composition and remuneration	AGM proposals		Proposal for the Chair and Vice Chair of the Board and composition of the Board’s		Board evaluation planning	Board composition
						Board remuneration	Corporate Governance Statement

	Board evaluation results			Committees			benchmarking
	Corporate Governance statement						Corporate Governance update
	Corporate Governance update						
Personnel Committee	Achievement & performance outcomes	Incentive finalization			Diversity review	Compensation strategy and philosophy	Incentive framework
	Incentive targets and objectives	Succession update				Talent summary review	Detailed equity plans
	Nokia Equity Program	Executive compensation review					Compensation risk assessment
	Culture update	Culture, demography and diversity updates					
Audit Committee	Q4 and full year financials	Review of Annual reports	Q1 financials	Technology presentations by the Audit firm candidates	Q2 financials	Q3 financials	Financial update
	Compliance, Internal Audit and Internal Controls updates	AGM proposals	Compliance Internal Audit and Internal Controls updates		Audit scope	Pension assets and liabilities	Enterprise Risk Management (ERM) update
	Review of audit services	Audit firm rotation			Review of audit services	Security	
	Audit firm rotation		Annual audit plan		Compliance, Internal Audit and Internal Controls updates	Audit firm rotation	Audit firm rotation
			Review of Auditor services				
			Security				
			Audit firm rotation				
Technology Committee				Review of new strategic technology initiatives			Review of new strategic technology initiatives

Updates on
major
innovation and
technology
trends

Updates on
major
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technology
trends

Furthermore, we engaged with our shareholders at the Annual General Meeting held in May where shareholders exercised decision-making power and their right to present questions to the Board and management. At that meeting, we also met our aim to have representation of at least 40% of both genders on our Board well in advance of the target date of January 1, 2020. In addition, the Board established a Technology Committee to review high level innovation and technology strategies of the Company and to engage in a dialogue with the management with respect to major

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innovation and technology trends, related risks and opportunities and the Company's technology competitiveness and bets. We also noted in the Annual General Meeting that we have started a tender process regarding the rotation of our audit firm in accordance with the EU Audit Regulation. This has been one of the key focus areas of the Board's Audit Committee in 2018. During 2018, the Chair of the Personnel Committee also engaged with our largest investors to discuss executive remuneration as well as the related governance and disclosure practices.

Regulatory framework

Our corporate governance practices comply with Finnish laws and regulations as well as with our Articles of Association. We also comply with the Finnish Corporate Governance Code, available at www.cgfinland.fi. Under the Finnish Corporate Governance Code a company is deemed to be in compliance with the Corporate Governance Code even if it departs from individual recommendations, provided that the departures are reported and explained.

In 2018, we complied with the Finnish Corporate Governance Code, with the exception that we were not in full compliance with the recommendation 24 as our restricted share plans did not include performance criteria but were time-based only. The restricted shares vest in three equal tranches on the first, second and third anniversary of the award subject to continued employment with Nokia. Restricted Shares are and will be granted on a limited basis for exceptional purposes related to retention and recruitment to ensure Nokia is able to retain and recruit vital talent for the future success of the company. The restricted share plan for 2019 is designed in a similar manner. The Board approves, upon recommendation from the Board's Personnel Committee, any long-term incentive compensation and all equity plans, programs or similar arrangements of significance that the company establishes for its employees.

We comply with the corporate governance standards of Nasdaq Helsinki which are applicable to us due to the listing of our shares on the exchange. Furthermore, as a result of the listing of our American Depositary Shares on the New York Stock Exchange (the NYSE) and our registration under the U.S. Securities Exchange Act of 1934, we must comply with the applicable U.S. federal securities laws and regulations, including the Sarbanes-Oxley Act of 2002 as well as the rules of the NYSE, in particular the corporate governance standards under Section 303A of the NYSE Listed Company Manual available at <http://nysemanual.nyse.com/lcm/>. We comply with these standards to the extent such provisions are applicable to us.

To the extent any non-domestic rules would require a violation of the laws of Finland, we are obliged to comply with Finnish law. There are no significant differences in the corporate governance practices applied by Nokia compared to those applied by the U.S. companies under the NYSE corporate governance standards with the exception that Nokia complies with Finnish law with respect to the approval of equity compensation plans. Under Finnish law, stock option plans require shareholder approval at the time of their launch. All other plans that include the delivery of company stock in the form of newly issued shares or treasury shares require shareholder approval at the time of the delivery of the shares unless a shareholder approval has been granted through an authorization to the Board, a maximum of five years earlier. The NYSE corporate governance standards require that the equity compensation plans are approved by the company's shareholders. Nokia aims to minimize the necessity for, or consequences of, conflicts between the laws of Finland and applicable non-domestic corporate governance standards.

The Board has also adopted corporate governance guidelines (Corporate Governance Guidelines) to reflect our commitment to good corporate governance. The Corporate Governance Guidelines include the directors' responsibilities, the composition and election of the members of the Board, its committees and certain other matters relating to corporate governance. In addition, the Committees of the Board have adopted charters that define committees' main duties and operating principles. We also have a Code of Conduct that is applicable to all of our employees, directors and management and the Code of Ethics applicable to the President and CEO, Chief Financial Officer, Deputy Chief Financial Officer, and Corporate Controller. All of the mentioned documents are available on our website at http://www.nokia.com/en_int/investors/corporate-governance.

Main corporate governance bodies of Nokia

Pursuant to the provisions of the Finnish Limited Liability Companies Act (2006/624, as amended) (the Finnish Companies Act) and Nokia's Articles of Association, the control and management of Nokia are divided among the shareholders at a general meeting, the Board, the President and CEO and the Group Leadership Team, chaired by the President and CEO.

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General Meeting of Shareholders

Nokia shareholders play a key role in corporate governance, with our Annual General Meeting offering a regular opportunity to exercise their decision-making power in the company. In addition, at the meeting the shareholders may exercise their right to speak and ask questions. Each Nokia share entitles a shareholder to one vote at general meetings of Nokia. The Annual General Meeting decides, among other things, on the election and remuneration of the Board, the adoption of the annual accounts, the distribution of profit shown on the balance sheet, and discharging the members of the Board and the President and CEO from liability, as well as on the election and fees of the external auditor.

In addition to the Annual General Meeting, an Extraordinary General Meeting may be convened when the Board considers such meeting to be necessary, or when the provisions of the Finnish Companies Act mandate that such a meeting must be held.

Board of Directors

The operations of Nokia are managed under the direction of the Board, within the framework set by the Finnish Companies Act and Nokia's Articles of Association as well as any complementary rules of procedure as defined by the Board, such as the Corporate Governance Guidelines and the charters of the Board's committees.

Election and composition of the Board of Directors, election of the Chair and Vice Chair of the Board and the Chairs and members of the Board's Committees

Pursuant to the Articles of Association of Nokia Corporation, we have a Board that is composed of a minimum of seven and a maximum of 12 members. The Board is elected at least annually at each Annual General Meeting with a simple majority of the shareholders' votes cast at the meeting. The term of a Board member begins at the closing of the general meeting at which he or she was elected, or later as resolved by the general meeting, and expire at the closing of the following Annual General Meeting. The Annual General Meeting convenes by June 30 annually.

Our Board's leadership structure consists of a Chair and Vice Chair elected annually by the Board, and confirmed by the independent directors of the Board from among the Board members upon the recommendation of the Corporate Governance and Nomination Committee. The Chair of the Board has certain specific duties as stipulated by Finnish law and our Corporate Governance Guidelines. The Vice Chair of the Board assumes the duties of the Chair of the Board in the event he or she is prevented from performing his or her duties.

The independent directors of the new Board also confirm the election of the members and chairs for the Board's committees from among the Board's independent directors upon the recommendation of the Corporate Governance and Nomination Committee and based on each committee's member qualification standards. These elections take place at the Board's assembly meeting following the general meeting.

Board diversity

The Board has adopted principles concerning Board diversity describing our commitment to promoting diverse Board composition and how diversity is embedded into our processes and practices when identifying and proposing new Board candidates as well as re-election of current Board members.

At Nokia, the Board diversity consists of a number of individual elements, including gender, age, nationality, cultural and educational backgrounds, skills and experience. At Nokia, diversity is not a static concept but rather a relevant mix of required elements for the Board as a whole that evolves with time based on, among other things, the relevant business objectives and future needs of Nokia. The Board diversity is treated as a means of improvement and development rather than an end in itself.

Nokia acknowledges and supports the resolution adopted by the Finnish Government on February 17, 2015 on gender equality on the boards of directors of Finnish large and mid-cap listed companies. We report annually our objectives relating to both genders being represented on our Board, the means to achieve them, and the progress we have made in achieving them. In 2018 we met our aim to have representation of at least 40% of both genders on our Board by January 1, 2020.

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Currently there are five different nationalities represented in the Board and 40% of the Board members are female.

	Risto Siilasmaa	Olivier Piou	Sari Baldauf	Bruce Brown	Jeanette Horan	Louis R. Hughes	Edward Kozel	Elizabeth Nelson	Carla Smits-Nusteling	Kari Stadigh
Gender	Male	Male	Female	Male	Female	Male	Male	Female	Female	Male
Year of birth	1966	1958	1955	1958	1955	1949	1955	1960	1966	1955
Nationality	Finnish	French	Finnish	American	British	American	American	American	Dutch	Finnish
On Board since	2008	2016	2018	2012	2017	2016	2017	2012	2016	2011
Tenure at AGM 2018	10	2	0	6	1	2	1	6	2	7

Experience and skills of the Board members

Members of the Board of Directors

The Annual General Meeting held on May 30, 2018 elected ten members Sari Baldauf, Bruce Brown, Jeanette Horan, Louis R. Hughes, Edward Kozel, Elizabeth Nelson, Olivier Piou, Risto Siilasmaa, Carla Smits-Nusteling and Kari Stadigh to the Board for a term ending at the close of the Annual General Meeting in 2019. Following the meeting, the Board also re-elected Risto Siilasmaa to continue to serve as the Chair and Olivier Piou as the Vice Chair of the Board.

The current members of the Board are all non-executive. For the term of the Board that began at the Annual General Meeting, all Board member candidates were determined to be independent under the Finnish corporate governance standards and the rules of the NYSE.

We do not have a policy concerning the combination or separation of the roles of the Chair of the Board and the President and CEO. Our leadership structure is dependent on our needs, shareholder value and other relevant factors applicable from time to time, while respecting the highest corporate governance standards. In 2018, Rajeev Suri served as the President and CEO while Risto Siilasmaa served as the Chair of the Board.

Biographical details of our current Board members

Chair Risto Siilasmaa

b. 1966

Chair of the Nokia Board. Board member since 2008. Chair since 2012. Chair of the Corporate Governance and Nomination Committee and member of the Technology Committee.

Master of Science (Eng.), Helsinki University of Technology, Finland.

President and CEO of F-Secure Oyj 1988–2006.

Chairman of the Board of Directors of F-Secure Oyj. Member of the Board of Directors of Futurice Oy. Member of the Board of Directors of Technology Industries of Finland. Member of European Roundtable of Industrialists. Member of the Global Tech panel, an initiative of EU High Representative Federica Mogherini.

Member 2013-2016 and Vice Chairman of the Board of Directors of the Confederation of Finnish Industries (EK) 2017-2018. Vice Chairman 2013-2015 and Chairman of the Board of Directors of Technology Industries of Finland 2016-2018. Chairman of the Board of Directors of Elisa Corporation 2008-2012.

Vice Chair Olivier Piou

b. 1958

Vice Chair of the Nokia Board. Board member and Vice Chair since 2016. Member of the Personnel Committee and the Technology Committee.

Engineer, École Centrale de Lyon, France.

Chief Executive Officer of Gemalto N.V. 2006–2016. Chief Executive Officer of Axalto N.V. 2004–2006. With Schlumberger Ltd 1981–2004, including numerous management positions in the areas of technology, marketing and operations, in France and the United States.

Member of the Board of Directors of Gemalto N.V. Member of the Board of Directors of the PESH foundation.

Member of the Board of Directors of Alcatel Lucent SA 2008–2016.

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Sari Baldauf

b. 1955

Nokia Board member since 2018. Member of the Personnel Committee and the Corporate Governance and Nomination Committee.

Master of Business Administration, Helsinki School of Economics and Business Administration. Bachelor of Science, Helsinki School of Economics and Business Administration. Honorary doctorates in Technology (Helsinki University of Technology) and Business Administration (Turku School of Economics and Business Administration and Aalto University School of Business).

Executive Vice President and General Manager, Networks Business Group, Nokia, 1998–2005. Various executive positions at Nokia in Finland and the United States 1983-1998.

Member of the Supervisory Board and Member of the Nomination Committee of Daimler AG. Member of the Board of Directors of Aalto University. Chair of the Vexve Holding Oy. Senior Advisor of DevCo Partners Oy.

Member of the Supervisory Board of Deutsche Telekom AG 2012 – 2018. Chair of the Board of Directors of Fortum Oyj 2011-2018. Member of the Board of Directors of Akzo Nobel 2012–2017. Member of the Board of Directors of F-Secure Oyj 2005-2014.

Bruce Brown

b. 1958

Nokia Board member since 2012. Chair of the Personnel Committee. Member of the Corporate Governance and Nomination Committee and the Technology Committee.

MBA, Xavier University, the United States. BS (Chemical Engineering), Polytechnic Institute of New York University, the United States.

Retired from The Procter & Gamble Company in 2014. Chief Technology Officer of the Procter & Gamble Company 2008–2014. Various executive and managerial positions in Baby Care, Feminine Care, and Beauty Care units of The Procter & Gamble Company since 1980 in the United States, Germany and Japan.

Member of the Board of Directors, the Audit Committee and the Nominating and Corporate Governance Committee of P. H. Glatfelter Company. Member of the Board of Directors, the Audit Committee and the Compensation Committee of Medpace, Inc.

Member of the Board of Directors of Agency for Science, Technology & Research (A*STAR) in Singapore 2011-2018.

Jeanette Horan

b. 1955

Nokia Board member since 2017. Member of the Audit Committee and the Technology Committee.

MBA, Business Administration and Management, Boston University, the United States. BSc, Mathematics, University of London, United Kingdom.

Various executive and managerial positions in IBM 1998-2015. Vice President of Digital Equipment Corporation 1994-1998. Vice President, Development, of Open Software Foundation 1989-1994.

Member of the Supervisory Board at Wolters Kluwer, and the Chair of the Remuneration Committee. Member of the Board of Advisors at Jane Doe No More, a non-profit organization.

Member of the Board of Advisors of Cyberreason 2017-2018. Member of the Board of Directors of West Corporation 2016-2017. Member of the Board of Directors of Microvision 2006-2017.

Louis R. Hughes

b. 1949

Nokia Board member since 2016. Member of the Audit Committee and the Technology Committee.

Master's Degree in Business Administration, Harvard University, Graduate School of Business, the United States. Bachelor of Mechanical Engineering, General Motors Institute, now Kettering University, the United States.

President & Chief Operating Officer of Lockheed Martin in 2000. Executive Vice President of General Motors Corporation 1992–2000. President of General Motors International Operations 1992–1998. President of General Motors Europe 1992–1994.

Chairman of InZero Systems (formerly GBS Laboratories) (the United States). Executive advisor partner of Wind Point Partners. Member of the Advisory Board, Cognomotiv (the United States).

Independent director and member of the Audit Committee of AkzoNobel 2006-2018. Independent director 2003-2018 and Chairman of the Audit, Finance and Compliance Committee of ABB 2011-2018. Member of the Board of Directors of Alcatel Lucent SA 2008–2016.

Edward Kozel

b. 1955

Nokia Board member since 2017. Chair of the Technology Committee and member of the Audit Committee.

Degree in Electrical Engineering and Computer Science, University of California, the United States.

President and CEO of Range Networks 2013-2014, Owner of Open Range 2000-2013, Chief Technology and Innovation Officer and member of the Board of Management of Deutsche Telecom 2010-2012, CEO of Skyrider 2006-2008, Managing Director of Integrated Finance 2005-2006, Senior Vice President, Business development and Chief Technology Officer and Board Member of Cisco 1989-2001.

Various Board Memberships in 1999–2009.

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Elizabeth Nelson

b. 1960

Nokia Board member since 2012. Member of the Audit Committee and the Personnel Committee.

MBA (Finance), the Wharton School, University of Pennsylvania, the United States. BS (Foreign Service), Georgetown University, the United States.

Executive Vice President and Chief Financial Officer, Macromedia, Inc. 1997–2005. Vice President, Corporate Development, Macromedia, Inc. 1996–1997. Various roles in Corporate Development and International Finance, Hewlett-Packard Company 1988–1996.

Chairman of the Board of Directors of DAI. Independent Lead Director and Chair of the Audit Committee of Zendesk Inc. Independent Director and Chair of the Audit Committee of Upwork Inc.

Member of the Board of Directors of Pandora Media 2013-2017. Member of the Board of Directors of Brightcove, Inc. 2010–2014.

Carla Smits-Nusteling

b. 1966

Nokia Board member since 2016. Chair of the Audit Committee and member of the Corporate Governance and Nomination Committee.

Master's Degree in Business Economics, Erasmus University Rotterdam, the Netherlands. Executive Master of Finance and Control, Vrije University Amsterdam, the Netherlands.

Member of the Board of Directors and Chief Financial Officer of KPN 2009–2012. Various financial positions in KPN 2000–2009. Various financial and operational positions in TNT/PTT Post 1990–2000.

Member of the Supervisory Board since 2013 and Chair of the Audit Committee of ASML. Member of the Board of Directors since 2013 and Chair of the Audit Committee of TELE2 AB. Member of the Management Board of the Unilever Trust Office since 2015. Lay Judge in the Enterprise Court of the Amsterdam Court of Appeal since 2015.

Kari Stadigh

b. 1955

Group CEO and President of Sampo plc. Nokia Board member since 2011. Member of the Personnel Committee and the Corporate Governance and Nomination Committee.

Master of Science (Eng.), Helsinki University of Technology, Finland. Bachelor of Business Administration, Hanken School of Economics, Helsinki, Finland.

Deputy CEO of Sampo plc 2001–2009. President of Sampo Life Insurance Company Limited 1999–2000. President of Nova Life Insurance Company Ltd 1996–1998. President and COO of Jaakko Pöyry Group 1991–1996.

Chairman of the Board of Directors of Mandatum Life Insurance Company Limited. Member of the Board of Directors of Waypoint Capital Group Holdings SA.

Chairman of the Board of Directors of If P&C Insurance Holding Ltd 2002-2019. Member of the Board of Directors of Nordea Bank AB (publ) 2010-2018. Chair of the Board Risk Committee (BRIC) of Nordea Bank AB (publ) 2011-2018. Member of the Board of Directors of Niilo Helanderin Säätiö 2005-2018.

Operations of the Board of Directors

The Board represents and is accountable to the shareholders of Nokia. While its ultimate statutory accountability is to the shareholders, the Board also takes into account the interests of the Company's other stakeholders. The Board's responsibilities are active, not passive, and include the responsibility to evaluate the strategic direction of Nokia, its management policies and the effectiveness of the implementation of such by the management on a regular basis. It is the responsibility of the members of the Board to act in good faith and with due care, so as to exercise their business judgment on an informed basis, in a manner which they reasonably and honestly believe to be in the best interests of Nokia and its shareholders. In discharging that obligation, the members of the Board must inform themselves of all relevant information reasonably available to them. The Board and each Board committee also have the power to appoint independent legal, financial or other advisers as they deem necessary. The Company will provide sufficient funding to the Board and to each committee to exercise their functions and provide compensation for the services of their advisers.

The Board is ultimately responsible for monitoring and reviewing Nokia's financial reporting process, effectiveness of related control and audit functions and the independence of Nokia's external auditor, as well as for monitoring the statutory audit of the annual and consolidated financial statements. The Board's responsibilities also include overseeing the structure and composition of our top management and monitoring legal compliance and the management of risks related to our operations. In doing so, the Board may set annual ranges and/or individual limits for capital expenditures, investments and divestitures and financial and non-financial commitments that may not be exceeded without a separate Board approval.

In risk management policies and processes, the Board's role includes risk analysis and assessment in connection with financial, strategy and business reviews, updates and decision-making proposals. Risk management policies and processes are integral parts of Board deliberations and risk-related updates are provided to the Board on a recurring basis. For a more detailed description of our risk management policies and processes, refer to “—Risk management, internal control and internal audit functions at Nokia—Main features of risk management systems” below.

The Board has the responsibility for appointing and discharging the President, the Chief Executive Officer, Chief Financial Officer and Chief Legal Officer. Since May 2014, Rajeev Suri has served as the President and CEO. His rights and responsibilities include those allotted to the President under Finnish law and he also chairs the Group Leadership Team.

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Subject to the requirements of Finnish law, the independent directors of the Board confirm the compensation and terms of employment of the President and CEO upon the recommendation of the Personnel Committee of the Board. The compensation and employment conditions of the other members of the Group Leadership Team are approved by the Personnel Committee upon the recommendation of the President and CEO.

Board evaluation

In line with our Corporate Governance Guidelines, the Board conducts annual performance evaluation which also include evaluation of the Board committees' work, the Board and Committee Chairs and individual Board members. In connection with the same, the Board conducts an evaluation of the President and CEO. In 2018, an independent external evaluator conducted the Board's evaluation processes consisting of Board self-evaluations, peer evaluations and interviews as well as the evaluation of the President and CEO. The evaluation process included both numeric assessments and the possibility to provide more detailed written and verbal comments. Feedback was also requested from selected members of management as part of the Board evaluation process. Each year, the results of the evaluation are discussed and analyzed by the entire Board and improvement actions are agreed based on such discussion.

Meetings of the Board of Directors

The Board held 19 meetings excluding committee meetings during 2018, of which approximately 37% were regularly scheduled meetings held in person, occasionally complemented by access via video or conference calls. The other meetings were held in writing.

	Number of meetings in person	Number of meetings in writing	Attendance in all meetings %
Full Board	7	12	100
Audit Committee	8	–	98
Personnel Committee	6	5	100
Corporate Governance and Nomination Committee	5	–	100
Technology Committee(1)	2	–	100

(1) From May 30, 2018 when the Board's Technology Committee was officially established.

Directors' attendance at Board and Committee meetings in 2018 is set forth in the table below:

	Board meetings %	Audit Committee meetings %	Corporate Governance and Nomination Committee meetings %	Personnel Committee meetings %	Technology Committee meetings(1) %
Risto Siilasmaa (Board Chair)	100		100		100
Olivier Piou (Board Vice Chair)	100			100(2)	100

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Sari Baldauf (from May 30, 2018)	100		100	100	
Bruce Brown	100		100	100	100
Jeanette Horan	100	88			100
Louis R. Hughes	100	100			100
Edward Kozel	100	100			100
Jean Monty (until May 30, 2018)	100			100	
Elizabeth Nelson	100	100		100(3)	
Carla Smits-Nusteling	100	100	100(3)		
Kari Stadigh	100		100	100	

(1) From May 30, 2018 when the Board's Technology Committee was officially established.

(2) Until May 30, 2018.

(3) From May 30, 2018.

Additionally, many of the directors attended, as non-voting observers, meetings of a committee of which they were not a member.

Directors meet without management in connection with each regularly scheduled meeting. According to Board practices, meetings without management present would only be attended by non-executive directors and be chaired by the non-executive Chair of the Board. If the non-executive Chair of the Board is unable to chair these meetings, the non-executive Vice Chair of the Board chairs the meeting. Additionally, the independent directors would meet separately at least once annually. In 2018 all members of the Board were non-executive and determined to be independent under the Finnish corporate governance standards and the rules of the NYSE.

All the directors, excluding Jean Monty, who served on the Board for the term until the close of the Annual General Meeting in 2018 attended Nokia's Annual General Meeting held on May 30, 2018.

Committees of the Board of Directors

The Board has four committees: the Audit Committee, Corporate Governance and Nomination Committee, Personnel Committee and Technology Committee. These committees assist the Board in its duties pursuant to their respective committee charters. The Board may also establish ad hoc committees for detailed reviews or consideration of particular topics to be proposed for the approval of the Board. Any director who so wishes may attend, as a non-voting observer, meetings of committees of which they are not members.

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The Audit Committee

The Committee consists of a minimum of three members of the Board who meet all applicable independence, financial literacy and other requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE. From May 30, 2018, the Audit Committee has consisted of the following five members of the Board: Carla Smits-Nusteling (Chair), Jeanette Horan, Louis R. Hughes, Edward Koziel and Elizabeth Nelson.

The Audit Committee is established by the Board primarily for the purpose of oversight of the accounting and financial reporting processes of Nokia and the audits of its financial statements. The Committee is responsible for assisting the Board in the oversight of:

- § the quality and integrity of the company's financial statements and related disclosures;
- § the statutory audit of the company's financial statements;
- § the external auditor's qualifications and independence;
- § the performance of the external auditor subject to the requirements of Finnish law;
 - § the performance of the company's internal controls and risk management and assurance function;
- § the performance of the internal audit function; and
- § the company's compliance with legal and regulatory requirements, including the performance of its ethics and compliance program.

In discharging its oversight role, the Audit Committee has full access to all company books, records, facilities and personnel. Audit Committee also maintains procedures for the receipt, retention and treatment of complaints received by the company regarding accounting, internal controls, or auditing matters and for the confidential, anonymous submission by our employees of concerns relating to accounting or auditing matters. Nokia's disclosure controls and procedures, which are reviewed by the Audit Committee and approved by the President and CEO and the Chief Financial Officer, as well as the internal controls over financial reporting, are designed to provide reasonable assurance regarding the quality and integrity of the company's financial statements and related disclosures. For further information on internal control over financial reporting, refer to "–Risk management, internal control and internal audit functions at Nokia–Description of internal control procedures in relation to the financial reporting process" below.

Under Finnish law, an external auditor is elected by a simple majority vote of the shareholders at the Annual General Meeting for one year at a time. The Audit Committee prepares the proposal to the shareholders, upon its evaluation of the qualifications and independence of the external auditor, of the nominee for election or re-election. Under Finnish law, the fees of the external auditor are also approved by the shareholders by a simple majority vote at the Annual General Meeting. The Committee prepares the proposal to the shareholders in respect of the fees of the external auditor, and approves the external auditor's annual audit fees under the guidance given by the Annual General Meeting. For information about the fees paid to Nokia's external auditor, PricewaterhouseCoopers Oy, during 2018, refer to "–Auditor fees and services" below.

The Board has determined that all members of the Audit Committee, including its Chair, Carla Smits-Nusteling, are "audit committee financial experts" as defined in the requirements of Item 16A of the annual report on Form 20-F filed with the U.S. Securities and Exchange Commission (SEC). Ms. Smits-Nusteling and each of the other members of the Audit Committee are "independent directors" as defined by Finnish law and Finnish Corporate Governance Code and in Section 303A.02 of the NYSE Listed Company Manual.

The Audit Committee meets a minimum of four times a year based on a schedule established at the first meeting following the appointment of the Committee. The Committee meets separately with the representatives of Nokia's management, heads of the internal audit, and ethics and compliance functions, and the external auditor in connection with each regularly scheduled meeting. The head of the internal audit function has, at all times, direct access to the

Audit Committee, without the involvement of management. Additionally, any director who so wishes may attend meetings of the Audit Committee as a non-voting observer.

Audit Committee pre-approval policies and procedures

The Audit Committee of the Board is responsible, among other matters, for oversight of the external auditor's independence, subject to the requirements of applicable legislation. The Audit Committee has adopted a policy regarding an approval procedure of audit services performed by the external auditors of Nokia Group and permissible non-audit services performed by the principal external auditor of the Nokia Group (the "Pre-approval Policy").

Under the Pre-approval Policy, proposed services either: (i) may be pre-approved by the Audit Committee in accordance with certain service categories described in the Pre-approval Policy (general pre-approval); or (ii) require the specific pre-approval of the Audit Committee (specific pre-approval). The Pre-approval Policy sets out the audit, audit-related, tax and other services that have received the general pre-approval of the Audit Committee. All other audit, audit-related (including services related to internal controls and significant mergers and acquisitions projects), tax and other services are subject to specific pre-approval by the Audit Committee. All service requests concerning generally pre-approved services will be submitted to an appointed Audit Committee delegate within management, who will determine whether the services are within the services generally pre-approved. The Pre-approval Policy is subject to annual review by the Audit Committee.

The Audit Committee establishes budgeted fee levels annually for each of the categories of audit and non-audit services that are pre-approved under the Pre-approval Policy, namely, audit, audit-related, tax and other services. At each regular meeting of the Audit Committee, the auditor provides a report in order for the Audit Committee to review the services that the auditor is providing, as well as the cost of those services.

The Corporate Governance and Nomination Committee

The Committee consists of three to five members of the Board who meet all applicable independence requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE. From May 30, 2018 the Corporate Governance and Nomination Committee has consisted of the following five members of the Board: Risto Siilasmaa (Chair), Sari Baldauf, Bruce Brown, Carla Smits-Nusteling and Kari Stadigh.

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The Corporate Governance and Nomination Committee's purpose is to prepare the proposals for the general meetings in respect of the composition of the Board and the director remuneration to be approved by the shareholders, and to monitor issues and practices related to corporate governance and to propose necessary actions in respect thereof.

The Committee fulfills its responsibilities by:

- § actively identifying individuals qualified to be elected members of the Board as well as considering and evaluating the appropriate level and structure of director remuneration;
- § preparing proposal to the shareholders on the director nominees for election at the general meetings as well as director remuneration;
- § monitoring significant developments in the law and practice of corporate governance and of the duties and responsibilities of directors of public companies;
- § assisting the Board and each Committee of the Board in its annual performance evaluations, including establishing criteria to be applied in connection with such evaluations;
- § developing and recommending to the Board and administering Nokia's Corporate Governance Guidelines; and
- § reviewing Nokia's disclosure in the corporate governance statement.

The Committee has the power and practice to appoint a recruitment firm to identify appropriate new director candidates.

The Personnel Committee

The Committee consists of a minimum of three members of the Board who meet all applicable independence requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE. From May 30, 2018 the Personnel Committee has consisted of the following five members of the Board: Bruce Brown (Chair), Sari Baldauf, Elizabeth Nelson, Olivier Piou and Kari Stadigh.

The primary purpose of the Personnel Committee is to oversee the personnel-related policies and practices at Nokia, as described in the Committee charter. It assists the Board in discharging its responsibilities in relation to all compensation, including equity compensation, of the company's executives and their terms of employment. The Committee has overall responsibility for evaluating, resolving and making recommendations to the Board regarding:

- § compensation of the company's top executives and their terms of employment;
- § all equity-based plans;
- § incentive compensation plans, policies and programs of the company affecting executives; and
- § other significant incentive plans.

The Committee is responsible for overseeing compensation philosophy and principles and ensuring the above compensation programs are performance-based, and designed to contribute to long-term shareholder value creation and alignment to shareholders' interests, properly motivate management, and support overall corporate strategies.

The Technology Committee

The Committee was established as of May 30, 2018 and consists of a minimum of three members of the Board who meet applicable independence requirements as stipulated by Finnish law and the rules of Nasdaq Helsinki and the NYSE and have such skills in innovation, technology and science matters as the Board determines adequate from time to time. From May 30, 2018 the Technology Committee has consisted of the following six members of the Board: Edward Kozel (Chair), Bruce Brown, Jeanette Horan, Louis R. Hughes, Olivier Piou and Risto Siilasmaa.

The primary purpose of the Technology Committee is to engage in a dialogue with and provide opinions and advice to management with respect to significant innovation and technology strategies of the Company which are formulated

and executed by the management of the Company, as described in the Committee charter.

In its dialogue with and provision of opinions and advice to the management, the Committee will periodically review:

- § the Company's approach to major technological innovations;
 - § key technology trends that may result in disruptive threats or opportunities;
 - § high-level risks and opportunities associated with the Company's Research and Development Programs; and
 - § the Company's technologic competitiveness and new strategic technology initiatives.
- Group Leadership Team and the President and CEO

We have a Group Leadership Team that is responsible for the operative management of Nokia. The Group Leadership Team is chaired by the President and CEO. The President and CEO's rights and responsibilities include those allotted to the President under Finnish law.

Members of the Nokia Group Leadership Team

Set forth below are the current members of the Group Leadership Team and their biographical details.

During 2018 and thereafter, the following new appointments were made to the Group Leadership Team:

- § Sanjay Goel was appointed President of Global Services and member of the Group Leadership Team as of April 1, 2018;
- § Sri Reddy was appointed Co-president of IP/Optical Networks and member of the Group Leadership Team as of May 15, 2018;

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- § Ricky Corker was appointed President of Customer Operations, Americas and member of the Group Leadership Team as of January 1, 2019;
- § Tommi Uitto was appointed President of Mobile Networks on November 22, 2018 and joined Group Leadership Team as of January 31, 2019; and
- § Sandra Motley was appointed President of Fixed Networks on January 1, 2019 and joined Group Leadership Team as of January 31, 2019.

During 2018, the following members of the Group Leadership Team resigned:

- § Igor Leprince, President of Global Services, stepped down from the Group Leadership Team as of March 31, 2018;
- § Gregory Lee, President of Nokia Technologies, stepped down from the Group Leadership Team as of May 31, 2018;
- § Marc Rouanne, President of Mobile Networks, stepped down from the Group Leadership Team as of November 22, 2018; and
- § Ashish Chowdhary, Chief Customer Operations Officer, stepped down from the Group Leadership Team as of December 31, 2018.

Furthermore, during 2018 and thereafter, the following changes took place within the Group Leadership Team:

- § Maria Varsellona, Chief Legal Officer and member of the Group Leadership Team was in addition to her role as Chief Legal Officer appointed President of Nokia Technologies as of May 31, 2018;
- § Kathrin Buvac, Chief Strategy Officer and member of the Group Leadership Team was in addition to her role as Chief Strategy Officer appointed President of Nokia Enterprise as of January 1, 2019; and
- § Federico Guillén, President of Fixed Networks and member of the Group Leadership Team was appointed President of Customer Operations, EMEA & APAC as of January 1, 2019.

Rajeev Suri

b. 1967

President and Chief Executive Officer of Nokia Corporation. Chair of the Group Leadership Team since 2014. Joined Nokia in 1995.

Bachelor of Engineering (Electronics and Communications), Manipal Institute of Technology, Karnataka, India.

CEO, Nokia Solutions and Networks 2009–2014. Head of Services, Nokia Siemens Networks 2007–2009. Head of Asia Pacific, Nokia Siemens Networks April 2007. Senior Vice President, Nokia Networks Asia Pacific 2005–2007. Vice President, Hutchison Customer Business Team, Nokia Networks 2004–2005. General Manager, Business Development, Nokia Networks Asia Pacific 2003. Sales Director–BT, O2 and Hutchison Global Customers, Nokia Networks 2002. Director, Technology and Applications, BT Global Customer, Nokia Networks 2000–2001. Head of Global Competitive Intelligence, Nokia Networks 1999–2000. Head of Product Competence Center, Nokia Networks South Asia 1997–1999. System Marketing Manager, Cellular Transmission, Nokia Networks India 1995–1997. Head of Group Procurement, imports and special projects, Churchgate Group, Nigeria 1993–1995. National Account Manager–Transmission/Manager–Strategic Planning, ICL India (ICIM) 1990–1993. Production Engineer, Calcom Electronics 1989.

Member of the Board of Directors of Stryker Corporation.

Basil Alwan

b. 1962

Co-president of IP/Optical Networks. Group Leadership Team member since 2016. Joined Nokia in 2016.

Bachelor in Computer Engineering, University of Illinois at Urbana-Champaign, the United States.

Previously President of IP Routing and Transport, Alcatel Lucent 2012–2016. President of IP Division, Alcatel Lucent 2003–2012. Founder, President and CEO, TiMetra Networks 2000–2003. Vice President and General Manager, Bay Networks (acquired by Nortel) Enterprise Products Division (EPD) 1997–2000. Vice President of Product Management and Marketing, Rapid City Communications 1996–1997.

Hans-Jürgen Bill

b. 1960

Chief Human Resources Officer. Group Leadership Team member since 2016. Joined Nokia Siemens Networks in 2007.

Diploma in Telecommunications from the University of Deutsche Bundespost, Dieburg/Darmstadt, Germany.
Diploma in Economics from the University of Applied Sciences, Pforzheim, Germany.

Executive Vice President, Human Resources, Nokia 2014–2016. Head of Human Resources, NSN 2009–2014. Head of West South Europe region, NSN 2007–2009. Head of Asia Pacific for Mobile Networks, Siemens 2003–2007. Head of Operations for Mobile Networks, Siemens 2001–2003. Head of Region Central-East and North Europe for Mobile Networks, Siemens 1998–2001. Head of Mobile Networks in Indonesia, Siemens 1994–1998. Various management positions, Siemens 1983–1994.

Kathrin Buvac

b. 1980

President of Nokia Enterprise and Chief Strategy Officer. Group Leadership Team member since 2016. Joined Nokia Siemens Networks in 2007.

Degree in Business Information Systems from University of Cooperative Education, Germany. Bachelor Degree in Business Administration from Open University, London, the United Kingdom.

Vice President, Corporate Strategy, Nokia Networks 2014–2016. Chief of staff to the CEO, Nokia Solutions and Networks 2011–2013. Head of Strategic Projects, Business Solutions, Nokia Siemens Networks 2009–2011. General Manager, Integration Programme, Nokia Siemens Networks

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2007–2009. General Manager, Corporate Audit, Siemens Holding S.p.A. 2006–2007. Head of Controlling International Businesses, Siemens Communications 2003–2006. Head of Performance Controlling USA, Siemens Communications 2002–2003. Business Process Manager Global IT Strategy, Siemens Communications 2001–2002. Business Analyst, EADS Aerospace and Defence 1999–2000.

Ricky Corker

b. 1967

President of Customer Operations, Americas. Group Leadership Team member since 2019. Joined Nokia in 1993.

Bachelor in Communications and Electronic Engineering from the Royal Melbourne Institute of Technology, Australia.

Executive Vice President and President of North America, Nokia 2011-2018. Head of APAC, Nokia Siemens Networks 2009-2011. Head of Sales, APAC, Nokia Siemens Networks 2009. Head of Asia North Region, Nokia Siemens Networks 2008-2009. Head of Hutchison Global Customer Business Team, Nokia Siemens Networks 2007-2008. Vice President APAC, Nokia Networks 2005-2007. Lead Sales Director APAC, Nokia Networks 2004-2005. Account Director Telstra, Nokia Networks 2002-2003. Account Director Vodafone Australia and New Zealand, Sales Director Vodafone APAC Customer Business Team, Nokia Networks 2001-2002. Commercial Director Global Accounts British Telecom, Nokia Networks 2001. Held senior sales and marketing positions at Nokia 1993-2001.

Joerg Erlemeier

b. 1965

Chief Operating Officer. Group Leadership Team member since 2017. Joined Nokia in 1994.

Bachelor of Engineering (Electronics and Telecommunications), Fachhochschule, Aachen, Germany.

Senior Vice President, Integration, Nokia, 2015. Vice President, Global Services, Europe, Nokia, 2015. Head of Delivery, North America market, Nokia, 2013–2014. Head of Program Management Office, Nokia Siemens Networks, 2012. Head of Middle East & Africa, Nokia Siemens Networks, 2009–2011. Held several executive level positions in Nokia/Nokia Siemens Networks, 1994–2009.

Barry French

b. 1963

Chief Marketing Officer. Group Leadership Team member since 2016. Joined Nokia in 2006.

Master's Degree in International Affairs from Columbia University's School of International and Public Affairs, New York, the United States. Bachelor of Arts degree in Political Science, Bates Colleges, Lewiston, Maine, the United States.

Chief Marketing Officer and Executive Vice President, Marketing and Corporate Affairs, Nokia 2014–2016. Head of Marketing and Corporate Affairs, Nokia Siemens Networks 2010–2014. Head of Communications, Nokia Siemens Networks 2006–2010. Vice President, Corporate Communications, United Airlines 2004–2006. Director, Corporate

Communications, Dell 2000–2004. Additional roles included communications, government relations and management positions, Engineering Animation, Raytheon, KRC Research and the Sawyer/Miller Group.

Sanjay Goel

b. 1967

President of Global Services. Group Leadership Team member since 2018. Joined Nokia Networks in 2001.

Bachelor's Degree in Engineering in Electronics and Communications from Manipal Institute of Technology, Karnataka, India.

Senior Vice President, Global Services Sales, Global Services 2015-2018. Senior Vice President, Services Portfolio Sales, Global Services, Nokia since 2015. Vice President, Services, Customer Operations, Asia, Middle East & Africa, Nokia Networks 2012 – 2015. Head of Global Services, Asia Pacific & Japan, Nokia Siemens Networks 2009-2012. Head of Managed Services, Asia Pacific (including India & Japan), Nokia Siemens Networks 2007-2009. Several director and manager level positions in Nokia Networks 2001-2007. Manager in IBM India 1996-2001. Several engineer positions in Asea Brown Boveri Ltd 1990-1996.

Bhaskar Gorti

b. 1966

President of Nokia Software. Group Leadership Team member since 2016. Joined Nokia in 2016.

Master's degree in Electrical Engineering from Virginia Polytechnic Institute and State University, Blacksburg, the United States. Bachelor's degree in Technology and Electrical Engineering from National Institute of Technology, Warangal, India.

Previously President of IP Platforms, Alcatel Lucent 2015–2016. Senior Vice President and General Manager, Communications Global Business Unit, Oracle 2006–2015. Senior Vice President, Portal Software 2002–2006.

Federico Guillén

b. 1963

President of Customer Operations, EMEA & APAC. Group Leadership Team member since 2016. Joined Nokia in 2016.

Degree in Telecommunications Engineering, ETSIT at Universidad Politécnica de Madrid, Spain. Master's degree in Switching & Communication Architectures, ETSIT at Universidad Politécnica de Madrid, Spain. Master's Degree in International Management, ESC Lyon and Alcatel, France.

President of Fixed Networks, Nokia, 2016-2018. President of Fixed Networks, Alcatel Lucent 2013–2016. President and CEO of Alcatel Lucent Spain & Global Account Manager Telefonica, Alcatel Lucent 2009–2013. Vice President Sales of Vertical Market Sales in Western Europe, Alcatel Lucent 2009. Head of Regional Support Centre within Alcatel Lucent's Fixed Access Division for South Europe, MEA, India and CALA 2007–2009. CEO, Alcatel Mexico & Global Account Manager, Telmex 2003–2007. Various R&D, Portfolio and Sales Management Positions, Telettra and then Alcatel in Spain, Belgium and the United States. 1989–2003.

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Sandra Motley

b. 1959

President of Fixed Networks. Group Leadership Team member since 2019. Joined Nokia in 2016.

Master of Business Administration (Finance), Farleigh Dickinson University, New Jersey, the United States. Executive Business Program graduate, Smith College, Massachusetts, the United States. Post-Masters Mechanical Engineering studies at Columbia University, New York. Degree in Mechanical Engineering from State University of New York at Buffalo.

Chief Operating Officer, Fixed Networks, Nokia 2017-2018. Chief Operating Officer, Wireless Business, Alcatel-Lucent 2011-2013. Vice President Sales, U.S. Wireless Accounts, Alcatel-Lucent 2009-2011. Vice President and General Manager of the CDMA Product Unit, Alcatel-Lucent 2007-2009. Various roles in North America & CALA in pre- and post-sales and business operations for Alcatel-Lucent's Wireless business.

Member of the Board of Advisors for Light Reading's Women in Communications.

Kristian Pullola

b. 1973

Chief Financial Officer. Group Leadership Team member since 2017. Joined Nokia in 1999.

Master of Science (Economics), the Hanken School of Economics, Helsinki, Finland. Finance diploma, the Stockholm School of Economics, Stockholm, Sweden.

Senior Vice President, Corporate Controller, Nokia 2011–2016. Vice President, Treasury & Investor Relations, Nokia 2009–2011. Vice President, Corporate Treasurer, Nokia 2006–2008. Director, Treasury Finance & Control, Nokia 2003–2006. Various roles in Nokia Treasury 1999–2003. Associate, Citibank International 1998–1999.

Member of the Board of Directors of Ilmarinen Mutual Pension Insurance Company.

Sri Reddy

b. 1964

Co-president of IP/Optical Networks. Group Leadership Team member since 2018. Joined Nokia in 2016.

Bachelor of Electrical Engineering, Jawaharlal Nehru Technological University, India. Masters of Electrical Engineering and Computer Science, Oregon State University, the United States. Master of Business Administration from Santa Clara University, the United States.

Senior Vice President and General Manager, IP Routing and Packet Core Business Unit, Nokia, 2016-2018. Vice President, Engineering, IP Routing, Alcatel-Lucent, 2003-2016. Vice President, Engineering, Timetra, 2000-2003. Vice President, Engineering, Bay Networks, 1991-1999.

Tommi Uitto

b. 1969

President of Mobile Networks. Group Leadership Team member since 2019. Joined Nokia in 1996.

Master's degree in industrial management, Helsinki University of Technology, Finland. Master's degree in operations management, Michigan Technological University, the United States.

Senior Vice President, Global Product Sales, Mobile Networks, Nokia 2016 – 2018. Senior Vice President, Global MBB Sales, Customer Operations, Nokia Networks, 2015 – 2016. Senior Vice President, West Europe, Customer Operations, Nokia Networks, 2013 – 2015. Head of Radio Cluster (SVP), Mobile Broadband, Nokia Siemens Networks, 2012 – 2013. Head of Global LTE Radio Access Business Line (VP), Mobile Broadband, Nokia Siemens Networks, 2011 – 2012. Head of Quality, Mobile Broadband, 2012. Head of Product Management, Network Systems, Nokia Siemens Networks, 2010. Head of Product Management, Radio Access, Nokia Siemens Networks, 2009. Head of WCDMA/HSPA and Radio Platforms Product Management, Nokia Siemens Networks, 2008. Head of WCDMA/HSPA Product Line Management, Nokia Siemens Networks, 2007. General Manager, Radio Controller Product Management, Nokia Networks 2005 – 2007. Director, Sales & Marketing (Lead Sales Director), France Telecom/Orangse Nokia Networks, 2002 – 2005. Operations Director, Northeast Europe, Central & Eastern Europe and Middle East, Nokia Networks, 1999 – 2002.

Maria Varsellona

b. 1970

President of Nokia Technologies and Chief Legal Officer. Group Leadership Team member since 2016. Joined Nokia Siemens Networks in 2013.

Law Degree from University of Palermo (Juris Doctor), Italy.

Executive Vice President and Chief Legal Officer, Nokia 2014–2016. General Counsel, NSN 2013–2014. Tetra Pak Group General Counsel, Tetra Laval Group 2011–2013. Sidel Group General Counsel, Tetra Laval Group 2009–2011. Senior Counsel Commercial Operations and Global Services, GE Oil & Gas 2006–2009. Senior Counsel Europe, Hertz Europe 2005–2006. Senior Counsel Global Services, GE Oil & Gas 2001–2005. Lawyer, Pini Birmingham & Partners 1998–2001. Lawyer, Greco Law Firm 1994–1998.

Member of the Board of Directors of Nordea Bank AB (publ).

Marcus Weldon

b. 1968

Corporate Chief Technology Officer and President of Nokia Bell Labs. Group Leadership Team member since 2017. Joined Nokia in 2016.

Ph.D (Physical Chemistry) degree, Harvard University, Cambridge, Massachusetts, United States. Bachelor of Science (Computer Science and Chemistry) joint degree, King's College, London, United Kingdom.

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Corporate Chief Technology Officer and President of Bell Labs, Alcatel Lucent (then Nokia) 2013–2016. Corporate Chief Technology Officer, Alcatel Lucent 2009–2013. Chief Technology Officer, Broadband Networks & Solutions, Alcatel Lucent 2006–2009. Member of Technical Staff, Bell Labs, Lucent Technologies 1997–2006.

Network Partner to Keen Venture Partners. Advisor to Mundi Ventures.

Risk management, internal control and internal audit functions at Nokia

Main features of risk management systems

We have a systematic and structured approach to risk management. Key risks and opportunities are primarily identified against business targets either in business operations or as an integral part of strategy and financial planning. Risk management covers strategic, operational, financial and hazard risks. Key risks and opportunities are analyzed, managed and monitored as part of business performance management with the support of risk management personnel and the centralized Enterprise Risk Management function.

The principles documented in the Nokia Enterprise Risk Management Policy, which is approved by the Audit Committee of the Board, require risk management and its elements to be integrated into key processes. One of the core principles is that the business or function head is also the risk owner, although all employees are responsible for identifying, analyzing and managing risks, as appropriate, given their roles and duties. Our overall risk management concept is based on managing the key risks that would prevent us from meeting our objectives, rather than solely focusing on eliminating risks. In addition to the principles defined in the Nokia Enterprise Risk Management Policy, other key policies reflect implementation of specific aspects of risk management.

Key risks and opportunities are reviewed by the Group Leadership Team and the Board in order to create visibility on business risks as well as to enable prioritization of risk management activities. Overseeing risk is an integral part of the Board's deliberations. The Board's Audit Committee is responsible for, among other matters, risk management relating to the financial reporting process and assisting the Board's oversight of the risk management function. The Board's role in overseeing risk includes risk analysis and assessment in connection with financial, strategy and business reviews, updates and decision-making proposals.

Description of internal control procedures in relation to the financial reporting process

The management is responsible for establishing and maintaining adequate internal control over financial reporting for Nokia. Our internal control over financial reporting is designed to provide reasonable assurance to the management and the Board regarding the reliability of financial reporting and the preparation and fair presentation of published financial statements.

The management conducts a yearly assessment of Nokia's internal controls over financial reporting in accordance with the Committee of Sponsoring Organizations framework (the "COSO framework", 2013) and the Control Objectives for Information and related technology of internal controls. The assessment is performed based on a top-down risk assessment of our financial statements covering significant accounts, processes and locations, corporate-level controls and information systems' general controls.

As part of its assessment the management has documented:

§ the corporate-level controls, which create the "tone from the top" containing the Nokia values and Code of Conduct and which provide discipline and structure to decision-making processes and ways of working. Selected items from our operational mode and governance principles are separately documented as corporate-level controls;

- § the significant processes, structured under so-called financial cycles. Financial cycles have been designed to: (i) give a complete end-to-end view of all financial processes; (ii) identify key control points; (iii) identify involved organizations; (iv) ensure coverage for important accounts and financial statement assertions; and (v) enable internal control management within Nokia;
 - § the control activities, which consist of policies and procedures to ensure the management's directives are carried out and the related documentation is stored according to our document retention practices and local statutory requirements; and
 - § the information systems' general controls to ensure that sufficient IT general controls, including change management, system development and computer operations, as well as access and authorizations, are in place.
- Further, the management has also:

§ assessed the design of the controls in place aimed at mitigating the financial reporting risks;

§ tested operating effectiveness of all key controls; and

§ evaluated all noted deficiencies in internal controls over financial reporting in the interim and as of year-end.

In 2018, Nokia has followed the procedures as described above and has reported on the progress and assessments to the management and to the Audit Committee of the Board on a quarterly basis.

Description of the organization of the internal audit function

We also have an internal audit function that acts as an independent appraisal function by examining and evaluating the adequacy and effectiveness of our system of internal control. Internal audit reports to the Audit Committee of the Board. The head of the internal audit function has direct access to the Audit Committee, without involvement of the management. The internal audit staffing levels and annual budget are approved by the Audit Committee. All authority of the internal audit function is derived from the Board. The internal audit aligns to the business regionally and by business and function.

Annually, an internal audit plan is developed with input from the management, including key business risks and external factors. This plan is approved by the Audit Committee. Audits are completed across the business focused on country level, customer level, IT system implementation, IT security, operations activities or at a Group function level. The results of each audit are reported to the management identifying issues, financial

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impact, if any, and the correcting actions to be completed. Quarterly, the internal audit function communicates the progress of the internal audit plan completion, including the results of the closed audits, to the Audit Committee.

The internal audit also works closely with our Ethics and Compliance office to review any financial concerns brought to light from various channels and, where relevant, works with Enterprise Risk Management to ensure priority risk areas are reviewed through audits.

In 2018, the internal audit plan was completed and all results of these reviews were reported to the management and to the Audit Committee.

Main procedures relating to insider administration

Our insider administration is organized according to the applicable European Union and Finnish laws and regulations. In addition, the Board of Directors has approved Nokia Insider Policy which sets out Nokia-wide rules and practices to ensure full compliance with applicable rules and that inside information is recognized and treated in an appropriate manner and with the highest integrity. The policy is applicable to all Nokia employees.

Persons discharging managerial responsibilities

Nokia has identified members of the Board of Directors and the Group Leadership Team as persons discharging managerial responsibilities who, along with persons closely associated with them, are required to notify Nokia and the Finnish Financial Supervisory Authority of their transactions with Nokia's financial instruments. Nokia publishes the transaction notifications.

In addition, under the Nokia Insider Policy, persons discharging managerial responsibilities are obligated to clear with the Vice President, Corporate Legal, a planned transaction in Nokia's financial instruments in advance. It is also recommended that trading and other transactions in Nokia's financial instruments are carried out in times when the information available to the market is as complete as possible.

Closed Window

Persons discharging managerial responsibilities are subject to a closed window period of 30 calendar days preceding the disclosure of Nokia's quarterly or annual result announcements, as well as the day of the disclosure. During the closed window period, persons discharging managerial responsibilities are prohibited from dealing in Nokia's financial instruments.

Nokia has imposed this closed window period also on separately designated financial reporting persons who are recurrently involved with the preparation of Nokia's quarterly and annual results announcements. These persons are separately notified of their status as designated financial reporting persons.

Insider Registers

Nokia does not maintain a permanent insider register. Insiders are identified on a case-by-case basis for specific projects and are notified of their insider status. Persons included in a project-specific insider register are prohibited from dealing in Nokia's financial instruments until the project ends or is made public.

Supervision

Our insider administration's responsibilities include internal communications related to insider matters and trading restrictions, setting up and maintaining our insider registers, arranging related trainings as well as organizing and overseeing compliance with the insider rules.

Violations of the Nokia Insider Policy must be reported to the Vice President, Corporate Legal. Nokia employees may also use channels stated in the Nokia Code of Conduct for reporting incidents involving alleged violations of the Nokia Insider Policy.

Share ownership of the Board of Directors and the Nokia Group Leadership Team

The following table sets forth the number of shares and ADSs held by the members of the Board at December 31, 2018 when they held a total of 2 384 135 shares and ADSs in Nokia, which represented approximately 0.04% of our outstanding shares and total voting rights excluding shares held by Nokia Group.

Name	Shares(1)	ADSs(1)
Risto Siilasmaa	1 347 954	
Olivier Piou	280 193	
Sari Baldauf	98 436	
Bruce Brown		128 135
Jeanette Horan	25 949	
Louis R. Hughes	67 776	
Edward Kozel	27 529	20 525
Elizabeth Nelson		72 857
Carla Smits-Nusteling	41 055	
Kari Stadigh	273 726	

(1) The number of shares or ADSs includes shares and ADSs received as director compensation as well as shares and ADSs acquired through other means. Stock options or other equity awards that are deemed as being beneficially owned under the applicable SEC rules are not included. For the number of shares or ADSs received as director compensation, refer to section "–Compensation" and Note 35, Related party transactions, of our consolidated financial statements included in this annual report on Form 20-F.

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The following table sets forth the number of shares and ADSs held by the President and CEO and the other members of the Group Leadership Team in office at December 31, 2018 when they held a total of 4 838 873 shares and ADSs in Nokia, which represented approximately 0.09% of our outstanding shares and total voting rights excluding shares held by Nokia Group.

Name	Position in 2018	Shares(1)	Beneficially owned shares ADSs(1)
Rajeev Suri	President and CEO	2 473 450	
Basil Alwan	Co-president of IP/Optical Networks	193 355	81 000
Hans-Jürgen Bill	Chief Human Resources Officer	216 869	
Kathrin Buvac	Chief Strategy Officer	125 502	
Ashish Chowdhary	Chief Customer Operations Officer	46 469	
Joerg Erlemeier	Chief Operating Officer	119 604	
Barry French	Chief Marketing Officer	254 889	
Sanjay Goel	President of Global Services	159 512	
Bhaskar Gorti	President of Nokia Software	171 493	
Federico Guillén	President of Fixed Networks	132 817	
Kristian Pullola	Chief Financial Officer	333 598	
Sri Reddy	Co-president of IP/Optical Networks President of Nokia Technologies and Chief Legal Officer		100 000
Maria Varsellona	Officer	364 179	
Marcus Weldon	Chief Technology Officer and President of Bell Labs	66 136	

(1) The number of shares or ADSs includes shares received as executive compensation as well as shares and ADSs acquired through other means. Stock options or other equity awards that are deemed as being beneficially owned under the applicable SEC rules are not included. For further information on compensation refer to section “–Compensation”.

Auditor fees and services

PricewaterhouseCoopers Oy has served as our auditor for each of the fiscal years in the three-year period ended December 31, 2018. The auditor is elected annually by our shareholders at the Annual General Meeting for the fiscal year in question. The Audit Committee of the Board prepares the proposal to the shareholders in respect of the appointment of the auditor based upon its evaluation of the qualifications and independence of the auditor to be proposed for election or re-election on an annual basis.

The following table presents fees by type paid to PricewaterhouseCoopers’ network of firms for the years ended December 31:

EURm	2018	2017
Audit fees(1)	24.9	25.3
Audit-related fees(2)	2.1	1.8
Tax fees(3)	1.8	1.2
All other fees(4)	0.2	0.1
Total	29.0	28.4

(1) Audit fees consist of fees incurred for the annual audit of the Group's consolidated financial statements and the statutory financial statements of the Group's subsidiaries.

(2) Audit-related fees consist of fees billed for assurance and related services that are reasonably related to the performance of the audit or review of the Group's financial statements or that are traditionally performed by the independent auditor, and include consultations concerning financial accounting and reporting standards; advice and assistance in connection with local statutory accounting requirements; due diligence related to mergers and acquisitions; and audit procedures in connection with investigations in the pre-litigation phase and compliance programs. They also include fees billed for other audit services, which are those services that only the independent auditor can reasonably provide, and include the provision of comfort letters and consents in connection with statutory and regulatory filings and the review of documents filed with the SEC and other capital markets or local financial reporting regulatory bodies.

(3) Tax fees include fees billed for: (i) services related to tax compliance including preparation and/or review of tax returns, preparation, review and/or filing of various certificates and forms and consultation regarding tax returns and assistance with revenue authority queries; compliance reviews, advice and assistance on other indirect taxes; and transaction cost analysis; (ii) service related to tax audits; (iii) services related to individual compliance (preparation of individual tax returns and registrations for employees (non-executives), assistance with applying visa, residency, work permits and tax status for expatriates); (iv) services related to technical guidance on tax matters; (v) services related to transfer pricing advice and assistance with tax clearances; and (vi) tax consultation and planning (advice on stock-based remuneration, local employer tax laws, social security laws, employment laws and compensation programs and tax implications on short-term international transfers).

(4) Other fees include fees billed for company establishments; liquidations; forensic accounting, data security, other consulting services and reference materials and services.

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Compensation

This section sets out our remuneration governance, policies and how they have been implemented within Nokia and includes our Remuneration Report where we provide disclosure of the compensation of our Board, the President and CEO and aggregated compensation information for the Group Leadership Team, other than the President and CEO, for 2018. We report information applicable to executive compensation in accordance with Finnish regulatory requirements and with requirements set forth by the U.S. Securities and Exchange Commission.

Highlights

- § While Q4 performance of the business was encouraging, 2018 was another challenging year and this is reflected in the annual bonus of the President and CEO, which paid out at 67% of target. While our revenue was down year-on-year we grew market share, however our operating profit performance and free cash flow were below expectation.
- § For 2019, we have shifted the President and CEO's pay mix, to align more closely with European norms. As a result, the President and CEO's target total compensation for 2019 increased by 2%, with his base pay increasing by 24%, and his long-term incentive target for 2019 decreasing by 14%. This returns his compensation mix to approximately 80% of total compensation being dependent on the performance of the company.
- § For 2019, driven by investor feedback and identification of metrics that better align with industry volatility, we have changed the long-term incentive policy and plan to be based on a three-year performance period.
- § For 2018, the Board decided to implement a co-investment long-term incentive award for the President and CEO and the Group Leadership Team, driven by: the short-term challenges in the business; the incremental investments required to position Nokia for the coming 5G investment cycle and growth in software and enterprise businesses; and retention challenges from higher long-term incentive awards by peer technology companies in the United States. The President and CEO invested EUR 3 024 000 in Nokia shares and received a matching performance share long-term incentive award target of EUR 6 048 000. The final value of the match is subject to the performance of the company, and therefore aligned with shareholder value creation.

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Word from the Chair of the Personnel Committee

Dear Fellow Shareholder,

Below we present our 2018 report on our compensation outcomes, and policy for 2019. As we move towards the Finnish implementation of the European Shareholder Rights Directive II (SRD), we reached out to nine of our largest shareholders, to consult with them on our policy and programs. We have made some policy changes for 2019 and we have integrated their feedback on disclosures in the way we have structured this year’s report. We have also taken steps to prepare for the SRD driven disclosures we will need to make in the future.

Business context

§ The outlook for Nokia’s business remains positive given the: upcoming investment cycle in 5G, and our unique and differentiated end to end portfolio as operators invest in and update their networks across multiple domains; the progress made in the Nokia Software business; and the Nokia Enterprise business rapidly becoming a pillar of growth.

§ While Q4 performance of the business was encouraging, 2018 was another challenging year for the business.

§ Despite a 1-2% decline in our primary addressable market, revenue grew 1% in 2018 excluding the impact of changes in foreign currency exchange rates. We have continued to execute our rebalancing for growth strategy. Profit performance was however below target, driven by increased market R&D investment in 5G technology and competitive pressure. Cash performance was also below target driven primarily by the swap costs of legacy Alcatel Lucent products, and continued restructuring costs.

§ In Q4 we re-organized and optimized the company structure to accelerate the strategy by sharpening customer focus, and driving focus and alignment around growing our four core businesses: Nokia Networks; Nokia Software, Nokia Enterprise and Nokia Technologies. We expect these changes will increase the probability of delivering the mid- and long-term targets that will drive the value creation our shareholders expect. The new structure became effective from January 1, 2019.

§ The Personnel Committee is confident that our compensation policy supports the execution of the strategy.

Strategy and compensation

At the core of Nokia’s philosophy lie two principles:

§ pay for performance; and aligning the interests of employees and shareholders; and

§ ensuring that compensation programs and policies support the delivery of the corporate strategy and create long-term sustainable shareholder value.

Over the mid- to long-term, it is our intent to deliver revenue growth at a higher level than the growth of our primary addressable market, to deliver earnings growth based on revenue growth and improving operating performance, and to deliver cash growth to pay for a stable and growing annual dividend to our shareholders, as well as fund investments in the future growth of the business. To support this, the metrics in our short- and long-term incentive plans focus on revenue, profit and cash flow.

Delivering sustainable value – Long-term incentive

Market share	Earnings per share	Free cash flow
Maintain and grow market share, positioning for the future	Efficient capital management and profitable growth	Ensuring the ability to invest and pay dividends

Delivering the next year’s step in the strategic plan – Short-term incentive

Revenue	Operating profit	Free cash flow
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Deliver annual plan revenues

Deliver annual plan
profitability

Deliver planned annual free cash
flow

Shareholder outreach

During 2018 we met with nine of our largest shareholders to hear their views on our compensation policies, programs and associated disclosures. Two strong themes stood out:

§ further clarifying our disclosures, and

§ increasing the performance period on performance shares to three years.

The 2019 long-term incentive plan will be based on performance over a three-year period. The Board believes the chosen metrics will incentivize the management to deliver the strategy and are aligned with shareholder value creation, and the Board is confident these metrics are a good match to the historic volatility of this market.

The disclosures in this report have been focused to simplify and to increase transparency of how we compensate our President and CEO and also the Group Leadership Team.

2018 compensation structure

Changes were made during 2018 to the compensation arrangements, in two main areas, to better align with our stated intent and to align senior managers interests further with those of our shareholders.

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Amendment of the metrics on the long-term incentive plan in 2018

We changed the balance of the measures to three equally weighted metrics better aligned to our strategy:

§ earnings per share

§ free cash flow

§ market share

We believe that these metrics best balance between operational performance and growing our market share in our primary addressable market, while ensuring we improve profitability, and improve our cash discipline to fund a stable and growing dividend as well as growth opportunities for the company. These performance metrics are also used for the 2019 performance share plan.

Co-investment arrangement for senior leaders

For 2018, the Board decided to implement an co-investment arrangement for the President and CEO and a targeted number of senior leaders, driven by:

§ the short-term challenges in the business, balanced by the mid- and long-term opportunities to create shareholder value;

§ the incremental investments required to position Nokia for the coming 5G investment cycle and growth in Nokia Software and Nokia Enterprise;

§ ensuring we retain key talent in the face of higher long-term incentive awards by peer technology companies in the United States.

The co-investment arrangement allowed the targeted employees to invest their own money in Nokia shares (up to a limit), and for each share purchased, to receive two performance shares under the 2018 long-term incentive plan as a match. The final value of the match is subject to the performance of the company, and therefore very aligned with shareholder value creation. The program was designed to ensure managements' and shareholders interests are inextricably linked. The program was well received by the targeted group with an 88% participation rate. Final payout from this plan would be in 2021, subject to the performance of the company.

As mentioned above, the President and CEO invested EUR 3 024 000 in Nokia shares and received a matching performance share long-term incentive award target of EUR 6 048 000.

This program was only done in 2018, and not repeated in 2019. As mentioned above, it is a three-year program. Looking forward this arrangement will have a lower opportunity, but the Board will retain it as an option to ensure that the company has the ability to attract, retain and motivate the right talent to lead the company.

2018 remuneration outcomes

With over 80% of the President and CEO's compensation based on performance, his total compensation depends on delivery of results. For 2018, while revenue growth was strong, profit and cash flow performance were below expectations.

The President and CEO received a payout from his 2015 long-term incentive award. The 2015 long-term incentive vested on January 1, 2018 with 123.75% of the target award vesting based on achievement against the revenue and earnings per share targets during the performance period years of 2015 and 2016.

The President and CEO also received the second tranche of a special long-term incentive award granted in 2016 to incentivize the delivery of synergies from the Alcatel Lucent acquisition.

The President and CEO's base salary remained at EUR 1 050 000 in 2018, the third year in which his base salary has remained at that level.

While revenue growth was strong, profit and cash flow performance were below target which was reflected in the President and CEO's annual short-term incentive award for 2018 being below target at 67%, equivalent to EUR 873 862.

Share ownership requirement

The President and CEO is required to own three times his base salary in Nokia shares and currently exceeds this requirement significantly. Since November 2016, the President and CEO has purchased Nokia shares in the market worth EUR 5 000 000 in addition to retaining shares that have vested from long-term incentives.

Looking to 2019

Looking ahead to 2019 we have made further changes to the structure of the compensation arrangements for the President and CEO and also to the long-term incentive plan in which our senior leaders participate. We reviewed the peer group to ensure its relevance and Rolls-Royce and Hexagon were removed from the group while Atos, Cap Gemini and BAe Systems were added as high technology companies based in Europe with comparable scale and complexity.

Key changes in variable compensation

- § The long-term incentive performance will now be assessed over a three-year period (increase from two years previously).
- § Performance metrics remain unchanged however we have rebalanced the weight of metrics in the short-term incentive with all financial metrics (revenue, operating profit and free cash flow) now equally weighted. The long-term incentive metrics remain unchanged with market share (in previous disclosures referred to as revenue relative to market), earnings per share and free cash flow equally weighted.
- § Variable pay remains subject to clawback provisions.

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Compensation of the President and CEO

The President and CEO invested EUR 3 024 000 in the co-investment arrangement launched in 2018 with a matching performance share award of EUR 6 048 000 at target value, the equivalent to EUR 2 016 000 per annum. To rebalance the mix of his compensation in 2019 toward a more European pay mix, the President and CEO has been awarded an increase in his base compensation offset by a reduction in his long-term incentive award. As a result, the President and CEO's target compensation for 2019 increased by 2%, with his base pay increasing by 24%, and his long-term incentive target for 2019 decreasing by 14%.

Long-term incentives

The 2019 long-term incentive will be based on performance over the life of the three-year plan, financial years 2019, 2020 and 2021. The metrics will continue to be market share, earnings per share and free cash flow, as described above.

The 2016 long-term incentive and performance share plan vested on January 1, 2019 with 46.25% of target award vesting based on the achievement against the revenue and earnings per share targets during the performance period of financial years 2016 and 2017.

The President and CEO will also receive the final tranche of a special long-term incentive award granted in 2016 to incentivize the delivery of synergies from the Alcatel Lucent acquisition.

Going forward

We will continue to work to ensure our compensation programs properly incentivize the management to deliver the strategy, and to ensure shareholder and management interests remain aligned. We will also continue to strive to increase transparency and understanding of our compensation plans and policies and share our analysis of their effectiveness. We continue to work to improve our disclosures and engagement and look forward to working with you, our shareholders, as we move toward a new era in Finland and Europe with the Shareholder Rights Directive II.

Bruce Brown, Chair of the Personnel Committee

Pay overview of the President and CEO

Element	Year ended 31 December 2019	Year ended 31 December 2018
Base salary	EUR 1 300 000	EUR 1 050 000
Short-term incentives(1)	Target award: 125% of base salary	Target award: 125% of base salary

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Minimum 0% of base salary

Minimum 0% of base salary

Maximum 281.25% of base salary

Maximum 281.25% of base salary

Measures:

80% Nokia scorecard

80% Nokia scorecard

1/3 revenue

1/5 revenue

1/3 operating profit

2/5 operating profit

1/3 free cash flow

2/5 free cash flow

20% Personal strategic objectives

20% Personal strategic objectives

Achievement against measures is multiplied by the business results multiplier (operating profit), the overriding affordability measure.

Achievement against measures is multiplied by the business results multiplier (operating profit), the overriding affordability measure.

Long-term incentives
(Performance
Shares)(1)

Target award: 200% of base salary (EUR 2 600 000)

Target award: 288% of base salary (EUR 3 024 000)

Minimum payout 0%

Minimum payout 0%

Maximum payout 200%

Maximum payout 200%

Metrics:

Market share

Market share

Earnings per share

Earnings per share

Free cash flow

Free cash flow

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Element	Year ended 31 December 2019	Year ended 31 December 2018
Co-investment arrangement		Matching performance share award of 2 times the shares purchased by the President and CEO under the arrangement in 2018.
Pension	Contribution to the mandatory TyEL pension plan in Finland.	The President and CEO purchased EUR 3 024 000 of shares in May 2018 and was granted a matching award of EUR 6 048 000 of performance shares, payout subject to performance condition. Contribution to the mandatory TyEL pension plan in Finland.
Benefits & mobility	Mobility related benefits, life and critical illness insurance and private medical insurance.	Mobility related benefits, life and critical illness insurance and private medical insurance.
Total Target Remuneration	EUR 7 541 000	EUR 7 402 000
Share ownership requirement	Target: 3 times base salary	Target: 3 times base salary
(1) Revenue, operating profit and earnings per share measures exclude costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.		

Remuneration Policy

In this section, we describe our Remuneration Policy for the President and CEO and the Board of Directors. This includes our considerations when determining the policy and operation of the policy. Below we also describe the principles of remunerating our Group Leadership Team, excluding the President and CEO.

While we are a Finnish company we compete in a global market for talent in the technology sector. In forming the policy we take into account the views of shareholders and the needs of the company to attract, retain and motivate individuals of suitable caliber and experience to lead Nokia. We also take into account the performance of the company, and where appropriate the individuals when assessing any potential changes against market practices and conditions and the compensation paid to our employees more broadly.

The Board regularly monitors the effectiveness of the measures used in our incentive plans to ensure that they align with and drive the strategy of the company.

Revenue, operating profit and earnings per share measures referred to in the Remuneration Policy exclude costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items as applicable.

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The President and CEO

The table below summarizes the main components of the compensation for the President and CEO.

Element	Purpose	Operation	Opportunity
Base pay	Provide competitive base salary to attract and retain individual with the requisite level of knowledge, skills and experience to lead our businesses.	Base pay is normally reviewed annually taking into consideration a variety of factors, including, for example, the following: performance of the company and the individual; remuneration of our external comparator group; changes in individual responsibilities; and employee salary increases across Nokia and in the local market.	Pay reviews are set within the context of employee increases and changes within the Nokia peer group. Changes reflect not only improving performance but also improving competence and skills as would be applied to any other employee in Nokia.
Short-term incentives	To incentivize and reward performance against delivery of the annual business plan.	Short-term incentives are based on performance against single year targets and normally paid in cash. Targets for the short-term incentives are set at the start of the year, in the context of analyst expectations and the annual plan, selecting measures that align to the delivery of Nokia's strategy. Achievement is assessed at the end of the year. Short-term incentives are subject to the clawback policy (see below).	On target opportunity up to 125% of base salary with a range between 0% to 281.25% of base salary depending on performance.
Long-term incentives	To reward for delivery of sustainable long-term performance, align the President and CEO's interests with those of shareholders and aid retention.	Annual long-term incentive awards are normally made in performance shares and paid for performance against longer-term targets. Targets are set in the context of the Nokia long-term plans and analyst forecasts ensuring that they are considered both	Target award level is 200% of base salary with a range of 0% and 200% of the target award (i.e. a maximum of 400% of base pay at face value) depending on performance. The Personnel Committee retains discretion to make awards up to twice that level in exceptional circumstances such as for example

		demanding and motivational.	upon recruitment, significant change in responsibilities, significant
		Long-term incentives are subject to the clawback policy (see below).	strategic change or other similar events. The use of discretion would be explained at the time.
Benefits & perquisites	To attract, retain and protect the President and CEO.	Benefits are made available as part of the same policy that applies to employees more broadly in the relevant country, with additional security provisions, as appropriate.	The value will be the cost to the company.
Relocation & mobility	To support the international mobility and ensure the right person is in the right location to meet business needs.	Support may be offered to cover additional costs related to relocation to and working in a location other than home country based on business need. The policy supports the mobility needs of an individual and their dependents or the reasonable costs of commuting.	Benefits are market specific and are not compensation for performing the role but provided to defray costs or additional burdens of a relocation or residence outside the home country.
Retirement plans	To provide for retirement with a level of certainty.	Retirement age is defined and pensions are provided in line with local country arrangements; in Finland this is the statutory Finnish pension system (Finnish TyEL). Under the TyEL arrangements, base salary, incentives and other taxable benefits are included in the definition of earnings while gains from equity related plans are not. No supplemental pension arrangements are provided in Finland.	Pursuant to Finnish legislation, Nokia is required to make contributions to the Finnish TyEL pension arrangements in respect of the President and CEO. Such payments can be characterized as defined contribution payments. The amount is disclosed in the Remuneration Report.

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Illustration of the earning opportunity for the President and CEO

The illustration below shows the minimum, target and maximum earning opportunity for the President and CEO.

Share ownership requirement

Nokia believes that it is desirable for its executives to own shares in Nokia to align their interests with those of shareholders and to ensure that their decisions are in the long-term interest of the company. The President and CEO is required to own three times his base salary in Nokia shares and is given a period of five years from appointment to achieve the required level of share ownership.

Remuneration on recruitment

Our policy on recruitment is to offer a compensation package which is sufficient to attract, retain and motivate the individual with the right skills for the required role. Any offer would be expected to fit within the framework described above.

On occasion, we may offer compensation to buy out awards or other lost compensation which the candidate held prior to joining Nokia, but which lapsed upon the candidate leaving their previous employer. Due consideration is given to the potential value and timing of such awards, taking into account any conditions attached to the awards and the likely performance against such conditions.

Clawback

The President and CEO is subject to a clawback policy where any restatement of financial results may result in the reclaiming of amounts previously paid which had been based on numbers which have since been materially restated. Any such reclaimed amount, and the period over which payments can be reclaimed, will take into account the circumstances and duration of any misstatement. In the case of unintentional misstatement payments made within the last three years may be subject to the policy at the discretion of the Personnel Committee.

Termination provisions

In the event of a termination of employment, any payable compensation is determined in line with legal advice regarding local legislation, country policies, contractual obligations and the rules of the applicable incentive and benefit plans. Current termination provisions of the President and CEO's service agreement are described under "—Termination provisions of the President and CEO".

Change of control arrangements are offered on a very limited basis only and are based on a double trigger structure, which means that both a specified change of control event and termination of the individual's employment must take place for any change of control-based severance payment to materialize.

Board of Directors

The Board's Corporate Governance and Nomination Committee periodically reviews the remuneration for the Chair and members of the Board against companies of similar size and complexity to ensure Nokia is able to attract a suitably diverse and relevant mix of skills and experience in order to maximize the value creation for shareholders.

The Annual General Meeting resolves annually on the remuneration to the Chair and members of the Board. The Chair of the Board's remuneration was last changed in 2008. The Board members' annual fees were last changed in 2016 with the previous change in 2007. The structure of the current Board remuneration is laid in the table below.

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Fees	Fees consist of annual fees and meeting fees. Approximately 40% of the annual fee is paid in Nokia shares purchased from the market on behalf of the Board members or alternatively delivered as treasury shares held by the Company. The balance is paid in cash, most of which is typically used to cover taxes arising from the paid remuneration. Meeting fees are paid in cash. Meeting fees are not paid to the Chair of the Board.
Incentives	Non-executive directors are not eligible to participate in any Nokia incentive plans and do not receive performance shares, restricted shares or any other equity-based or other form of variable compensation for their duties as members of the Board.
Pensions	Non-executive directors do not participate in any Nokia pension plans.
Share ownership requirement	Members of the Board shall normally retain until the end of their directorship such number of shares that corresponds to the number of shares they have received as Board remuneration during their first three years of service in the Board (the net amount received after deducting those shares needed to offset any costs relating to the acquisition of the shares, including taxes).
Other	Directors are compensated for travel and accommodation expenses as well as other costs directly related to Board and Committee work. The compensation is paid in cash.

Remuneration for the term that began at the Annual General Meeting held on May 30, 2018 and ends at the close of the Annual General Meeting in 2019 consists of the following fees:

Annual fee	EUR
Chair	440 000
Vice Chair	185 000
Member	160 000
Chair of Audit Committee	30 000
Member of Audit Committee	15 000
Chair of Personnel Committee	30 000
Chair of Technology Committee	20 000
Meeting fee(1)	EUR
Meeting requiring intercontinental travel	5 000
Meeting requiring continental travel	2 000

(1) Paid for a maximum of seven meetings per term. Not paid to the Chair of the Board.

Remuneration Report

The Remuneration Report provides information on the remuneration of the President and CEO and the Board of Directors between January 1, 2018 and December 31, 2018. We also describe the remuneration to our Group Leadership Team, excluding the President and CEO, on aggregate level below. Revenue, operating profit and earnings per share measures referred to in the Remuneration Report exclude costs related to the acquisition of Alcatel Lucent

and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

The President and CEO

The following table shows the remuneration received by the President and CEO in 2018 and 2017. The long-term incentive payments reflect actual payments in the respective years attributable to the vesting of the 2014 plan in 2017, the 2015 Nokia performance share plan in 2018 and a special long-term incentive related to delivery of synergies from the Alcatel Lucent acquisition which pays in three tranches, in 2017, 2018 and 2019.

EUR	2018	2017
Salary	1 050 000	1 050 000
Short-term incentive ¹	873 862	997 369
Long-term incentive	2 597 426	4 261 633
Other compensation(2)	129 721	114 557
Total	4 651 009	6 423 559

(1) Short-term incentives represent amounts earned in respect of the financial year, but that are paid in April of the following year.

(2) Other compensation includes compensation for housing equaling EUR 45 890 (2017: EUR 44 463); travel assistance equaling EUR 35 454 (2017: EUR 22 628); Tax services equaling EUR 12 230 (2017: EUR 17 595) and other benefits including mobile phone, driver and supplemental medical and disability insurance equaling EUR 36 147 (2017: EUR 29 871).

Pursuant to Finnish legislation, Nokia is required to make contributions to the Finnish TyEL pension arrangements in respect of the President and CEO. Such payments can be characterized as defined contribution payments. In 2018, payments to the Finnish state pension system equaled EUR 312 607 (EUR 338 787 in 2017).

Short-term incentive

The 2018 short-term incentive framework for the President and CEO was based on three core metrics: revenue, operating profit and free cash flow.

The short-term incentive for the President and CEO were based on the achievement of key financial targets and other strategic objectives, as defined above. Performance against these defined targets was then multiplied by a business results multiplier, which acts as a funding factor (based on operating profit) for the incentive plan for most employees, to determine the final payment.

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Short-term incentive targets and achievements reflect the challenging market conditions yet also show the operational resilience of our business. In line with Nokia's performance in 2018, the short-term incentive of the President and CEO equaled EUR 873 862, or 66.57% of the target award, reflecting the over-delivery on revenue, but below target delivery of operating profit and free cash flow. Achievement by each element of the short-term incentive plan was as follows:

Metric	Weight	Target EURm	Achievement	
Revenue	20%	21 952	123.35	%
Operating profit	40%	2 288	76.72	%
Free cash flow	40%	230	24.34	%

Long-term incentive

In 2018, the President and CEO's 2015 performance share award vested at 123.75% of the target award valued at EUR 2 255 161. This was based on performance of financial years 2015 and 2016.

In 2016, the President and CEO was granted a share award subject to the fulfillment of predetermined and demanding performance conditions related to the successful integration of Nokia and Alcatel Lucent. This award vests in three equal tranches, the second of which was in 2018 and worth EUR 342 265.

For 2018, the Board decided to implement an co-investment long-term incentive award for the President and CEO and a targeted number of senior leaders, to further increase alignment of management's and shareholders' interests and to maximize long-term shareholder value creation, driven by:

- § the short-term challenges in the business, balanced by the mid- and long-term opportunities to create shareholder value;
- § the incremental investments required to position Nokia for the coming 5G investment cycle and growth in Nokia Software and Nokia Enterprise; and
- § ensuring we retain key talent in the face of higher long-term incentive awards by peer technology companies in the United States.

Under the co-investment arrangement, the participants were offered a matching award of two 2018 Performance Shares for each Nokia share that they purchase voluntarily with their own funds from the open market, with the payout of the Performance Shares subject to the performance of the company. For each participant, the arrangement was offered in addition to their normal annual long-term incentive award, and the maximum investment value corresponded to their normal annual long-term incentive award set by the company. The related purchases of shares by the President and CEO were executed in May 2018 and the shares purchased under the arrangement must be held until January 1, 2021 in order for the matching performance share award to vest.

The President and CEO invested EUR 3 024 000 to purchase 575 309 Nokia shares under the co-investment arrangement in May 2018.

In 2018, the President and CEO was awarded the following equity awards under the Nokia equity program:

Units awarded	Grant date fair value (EUR)	Grant date	Vesting date
---------------	-----------------------------	------------	--------------

Performance share awards(1)				
Awarded as regular performance share award	677 600	2 975 477	July 4, 2018	January 1, 2021
Awarded as matching performance share award under the co-investment agreement	1 150 618	5 052 594	July 4, 2018	January 1, 2021

(1) The 2018 performance share plan has a two-year performance period based on financial targets and a one-year restriction period. There is no minimum payout at below threshold performance for the President and CEO. The maximum payout would be 200% subject to maximum performance against all the performance criteria. Vesting is subject to continued employment.

Share ownership

Our share ownership policy requires that the President and CEO holds a minimum of three times his base salary in Nokia shares in order to ensure alignment with shareholder interests over the long term. This requirement has been met.

	Units	Value(1) (EUR)
Beneficially owned shares as of December 31, 2018	2 473	
Vested shares under the 2016 performance share plan delivered on February 12, 2019(2)	450	12 441 454
Unvested shares under outstanding Nokia equity plans(3)	263	
	071	1 323 247
	2 000	
	584	10 062 938
	4 737	
Total	105	23 827 639

(1) The values are based on the closing price of a Nokia share of EUR 5.03 on Nasdaq Helsinki on December 28, 2018.

(2) The value of the shares at delivery was based on fair market value of a Nokia share of EUR 5.45 on Nasdaq Helsinki on February 12, 2019 giving a total value delivered of EUR 1 433 737. The number of shares delivered reflects the net number of shares delivered after the applicable taxes were withheld from the number of shares that vested to the President and CEO.

(3) The number of units represents the number of unvested awards as of December 31, 2018 including the payout factor of the 2017 performance share plan and excluding the 2016 performance share plan that vested on January 1, 2019.

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Termination provisions of the President and CEO

Currently the termination provisions for the President and CEO's service agreement specify alternatives for termination and associated compensation in accordance with the following table:

Termination Reason by		Notice	Compensation
Nokia	Cause	None	The President and CEO is entitled to no additional compensation and all unvested equity awards would be forfeited.
Nokia	Reasons other than cause	Up to 18 months	The President and CEO is entitled to a severance payment equaling up to 18 months of compensation (including annual base salary, benefits, and target incentive) and unvested equity awards would be forfeited.
President and CEO	Any reason	Six months	The President and CEO may terminate his service agreement at any time with six months' prior notice. The President and CEO would either continue to receive salary and benefits during the notice period or, at Nokia's discretion, a lump sum of equivalent value. Additionally, the President and CEO would be entitled to any short- or long-term incentives that would normally vest during the notice period. Any unvested equity awards would be forfeited.
President and CEO	Nokia's material breach of the service agreement	Up to 18 months	In the event that the President and CEO terminates his service agreement based on a final arbitration award demonstrating Nokia's material breach of the service agreement, he is entitled to a severance payment equaling up to 18 months of compensation (including annual base salary, benefits and target incentive). Any unvested equity awards would be forfeited.

The President and CEO's service agreement includes special severance provisions in the event of a termination of employment following a change of control event. Such change of control provisions are based on a double trigger structure, which means that both a change of control event and the termination of the President and CEO's employment within a defined period of time must take place in order for any change of control-based severance payment to become payable. More specifically, if a change of control event has occurred, as defined in the service agreement, and the President and CEO's service with Nokia is terminated by either Nokia or its successor without cause, or by the President and CEO for "good reason", in either case within 18 months from such change of control event, the President and CEO would be entitled to a severance payment equaling up to 18 months of compensation (including annual base salary, benefits, and target incentive) and cash payment (or payments) for the pro-rated value of his outstanding unvested equity awards, restricted shares, performance shares and stock options (if any), payable pursuant to the terms of the service agreement. "Good reason" referred to above includes a material reduction of the President and CEO's compensation and a material reduction of his duties and responsibilities, as defined in the service agreement and as determined by the Board.

The President and CEO is subject to a 12-month non-competition obligation that applies after the termination of the service agreement or the date when he is released from his obligations and responsibilities, whichever occurs earlier.

Board of Directors

In 2018, the aggregate amount of compensation paid to the members of the Board for their services on the Board and its committees equaled EUR 2 203 000.

The Annual General Meeting held on May 30, 2018 resolved to elect ten members to the Board. The following members of the Board were re-elected for a term ending at the close of the Annual General Meeting in 2019: Bruce Brown, Jeanette Horan, Louis R. Hughes, Edward Kozel, Elizabeth Nelson, Olivier Piou, Risto Siilasmaa, Carla Smits-Nusteling and Kari Stadigh. Sari Baldauf was elected as a new member of the Board for the same term. For director remuneration resolved by the Annual General Meeting for the current term refer to “Remuneration Policy—Board of Directors” above.

The following table outlines the total annual compensation paid in 2018 to the members of the Board for their services, as resolved by the shareholders. The table does not include the meeting fees as resolved by the Annual General Meeting in 2018 since those fees for the ongoing term will be paid in 2019. For details of Nokia shares held by the members of the Board, refer to “Corporate Governance Statement—Share ownership of the Board of Directors” above.

	Annual fee (EUR)	Meeting fees (EUR)	Total remuneration paid (EUR)	Number of Shares Approximately 40% of the annual fee
Risto Siilasmaa, Board Chair	440 000	-	440 000	34 749
Olivier Piou, Board Vice Chair	185 000	11 000	196 000	14 610
Sari Baldauf	160 000	-	160 000	12 636
Bruce Brown	190 000	24 000	214 000	15 005
Jeanette Horan	175 000	20 000	195 000	13 820
Louis R. Hughes	175 000	24 000	199 000	13 820
Edward Kozel	195 000	22 000	217 000	15 400
Jean C. Monty	-	14 000	14 000	-
Elizabeth Nelson	175 000	17 000	192 000	13 820
Carla Smits-Nusteling	190 000	16 000	206 000	15 005
Kari Stadigh	160 000	10 000	170 000	12 636
Total			2 203 000	161 501

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Remuneration governance

We manage our remuneration through clearly defined processes, with well-defined governance principles, ensuring that no individual is involved in the decision-making process related to their own remuneration and that there is appropriate oversight of any compensation decision. Remuneration of the Board is annually presented to shareholders for approval at the Annual General Meeting and the remuneration of the President and CEO is approved by the Board.

The General Meeting of Shareholders

- § Shareholders approve the composition of the Board and the director remuneration based on proposals of the Board's Corporate Governance and Nomination Committee, which actively considers and evaluates the appropriate level and structure of director remuneration. The composition of the Board and director remuneration are resolved by a majority vote of the shareholders represented at the General Meeting and determined as of the date of the General Meeting, until the close of the next Annual General Meeting.
- § Shareholders authorize the Board to resolve to issue shares, for example, to settle the company's equity-based incentive plans based on the proposal of the Board.

The Board of Directors

- § Approves, and the independent members of the Board confirm, the compensation of the President and CEO, upon recommendation of the Personnel Committee;
- § Approves, upon recommendation of the Personnel Committee, any long-term incentive compensation and all equity plans, programs or similar arrangements of significance that the company establishes for its employees; and
- § Decides on the issuance of shares (under authorization by shareholders) to fulfill the company's obligations under equity plans in respect of vested awards to be settled.

The Personnel Committee

The Personnel Committee assists the Board in discharging its responsibilities relating to all compensation, including equity compensation, of the company's executives and the terms of employment of the executives.

- § In respect of the President and CEO, the Committee is accountable to the Board for:
 - reviewing and recommending to the Board the goals and objectives relevant to compensation;
 - evaluating and presenting to the Board the assessment of performance in light of those goals and objectives; and
 - proposing to the Board the total compensation based on this evaluation.
- § In respect of the other members of the Group Leadership Team (other than the President and CEO) and the direct reports to the President and CEO in Vice President-level positions and above, the Committee:
 - reviews and approves the goals and objectives relevant to the compensation, upon recommendation of the President and CEO;
 - reviews the results of the evaluation of performance in relation to the approved goals and objectives. The Committee approves the incentive compensation based on such evaluation;
 - approves and oversees the total compensation recommendations made by the President and CEO; and
 - reviews and approves compensation proposals made by the President and CEO in the event of termination of employment of a member of the Group Leadership Team.
- § The Committee reviews periodically, and makes recommendations to the Board regarding any equity programs, plans and other long-term incentive compensation arrangements, or similar arrangements of significance that the company establishes for, or makes available to, its employees, the appropriateness of the allocation of benefits under the plans and the extent to which the plans are meeting their intended objectives.
- § The Committee reviews and resolves, at its discretion, any other significant compensation arrangements applicable to the wider executive population in the Nokia Group.

§

The Committee reports to the Board at least annually on its views as to whether the President and CEO is providing the necessary leadership for the company in the long- and short-term.

- § The Committee reviews and discusses with management the compensation philosophy, strategy, principles, and management compensation to be included in our Remuneration Report.
- § The Committee reviews annually the company's share ownership policy to determine the appropriateness of the policy against its stated objectives.
- § The Committee has the power, in its sole discretion, to retain compensation consultants having special competence to assist the Personnel Committee in evaluating director and executive compensation.
- § The Committee reviews and approves changes to the company's peer group for the assessment of the competitiveness of our compensation from time to time.

The Committee consults regularly with the President and CEO and the Chief Human Resources Officer though they are not present when their own compensation is reviewed or discussed.

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Work of the Personnel Committee

The Personnel Committee convened six times during 2018 with a general theme for each meeting. In addition to meetings in person, the Committee held five meetings in writing.

2017 achievement review and short-term incentive plan payment approvals including review of the performance of the President and CEO	Compensation strategy and philosophy review
Budget approval for the 2018 Nokia equity program and performance review for the 2016 performance share plan	Talent Review
Review of the Group Leadership Team succession planning	§
Share ownership policy compliance review	
Review of the 2017 Remuneration Statement and Report	market and legal environment; and
Group Leadership Team compensation reviews	adviser market practices
Say on Pay	framework for the short-term incentive program for 2019;
Investor Outreach Feedback	framework for the long-term incentive program for 2019; and
	the Remuneration Statement and Report for 2018
	§
January:	October:
2017 achievement review and short-term incentive plan payment approvals including review of the performance of the President and CEO	Compensation strategy and philosophy review
Budget approval for the 2018 Nokia equity program and performance review for the 2016 performance share plan	Talent overview
Review of the Group Leadership Team succession planning	Review of Alcatel Lucent 2014 performance share plan

March:

Share ownership policy compliance review
Review of the 2017 Remuneration Statement and Report
Group Leadership Team compensation reviews

July:

Review of:
The EU Shareholder Rights Directive II
Shareholder outreach feedback

Update on:

market and legal environment; and
adviser market practices

November:

Review of:
framework for the short-term incentive program for 2019;
framework for the long-term incentive program for 2019; and
the Remuneration Statement and Report for 2018
Risk review

The President and CEO

The President and CEO has an active role in the compensation governance and performance management processes for the Group Leadership Team and the wider employee population at Nokia.

The President and CEO is not a member of the Personnel Committee and does not vote at Personnel Committee meetings, nor does he participate in any conversations regarding his own compensation.

Advisors

The Personnel Committee engaged Willis Towers Watson, an independent external consultant, to assist in the review and determination of executive compensation and program design and provide insight into market trends and regulatory developments.

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Nokia Group Leadership Team remuneration

At the end of 2018, the Group Leadership Team consisted of 14 persons split between Finland, other European countries and the United States. Changes to the Group Leadership Team as of January 1, 2019 are described in the Corporate Governance Statement above.

Name	Position in 2018	Appointment date
Rajeev Suri	President and CEO	May 1, 2014
Basil Alwan	Co-president of IP/Optical Networks	January 8, 2016
Hans-Jürgen Bill	Chief Human Resources Officer	January 8, 2016
Kathrin Buvac(1)	Chief Strategy Officer	January 8, 2016
Ashish Chowdhary(2)	Chief Customer Operations Officer	January 8, 2016
Joerg Erlemeier	Chief Operating Officer	December 11, 2017
Barry French	Chief Marketing Officer	January 8, 2016
Sanjay Goel	President of Global Services	April 1, 2018
Bhaskar Gorti	President of Nokia Software	January 8, 2016
Federico Guillén	President of Fixed Networks	January 8, 2016
Kristian Pullola	Chief Financial Officer	January 1, 2017
Sri Reddy	Co-president of IP/Optical Networks	May 15, 2018
Maria Varsellona(3)	President of Nokia Technologies and Chief Legal Officer	January 8, 2016
Marcus Weldon	Chief Technology Officer and President of Bell Labs	April 1, 2017

(1) Kathrin Buvac was nominated President of Nokia Enterprise from January 1, 2019, in addition to her existing role as Chief Strategy Officer..

(2) Ashish Chowdhary was a member of the Group Leadership Team until December 31, 2018

(3) Maria Varsellona was nominated President of Nokia Technologies from May 31, 2018, in addition to her existing role as Chief Legal Officer.

The following persons stepped down from the Group Leadership Team during 2018.

Name	Position in 2018	Appointment date	Leaving date
Gregory Lee	President of Nokia Technologies	June 30, 2017	May 31, 2018
Igor Leprince	President of Global Services	April 1, 2017	March 31, 2018
Marc Rouanne	President of Mobile Networks	January 8, 2016	November 22, 2018

The remuneration of the members of the Group Leadership Team (excluding the President and CEO) consists of base salary, fringe benefits and short- and long-term incentives and follows the same policy framework as the President and CEO and other eligible employees, except that the quantum differs by role. Short-term incentive plans are based on rewarding the delivery of business performance utilizing certain, or all, of the following metrics as appropriate to the member's role: revenue, operating profit, free cash flow and defined strategic objectives.

Remuneration on recruitment

Our policy on recruitment is to offer a compensation package which is sufficient to attract, retain and motivate individuals with the right skills for the required role. On occasion, we may offer compensation to buy out awards or other lost compensation which the candidate held prior to joining Nokia, but which lapsed upon the candidate leaving their previous employer. Due consideration is given to the potential value and timing of such awards and will take into account any conditions attached to the awards and the likely performance against such conditions.

Clawback

Our executives are subject to a clawback policy where any restatement of financial results may result in the reclaiming of amounts previously paid which had been based on numbers which have since been materially restated. Any such reclaimed amount, and the period over which payments can be reclaimed, will take into account the circumstances and duration of any misstatement.

Share ownership policy

Members of the Group Leadership Team are required to own two times their base salary in Nokia Shares. They are given five years from joining the Group Leadership Team to meet the requirements of the policy.

Pension arrangements of the Group Leadership Team

The members of the Group Leadership Team participate in the local retirement plans applicable to employees in the country of residence. Executives based in Finland participate in the statutory Finnish pension system, as regulated by the Finnish TyEL.

Executives based outside Finland participate in arrangements relevant to their location. Retirement plans vary by country and include defined benefit, defined contribution and cash balance plans. The retirement age for the members of Group Leadership Team varies between 60 and 65.

Termination provisions

In all cases, if an executive is dismissed for cause, no compensation will be payable and no outstanding equity will vest.

In the event of termination by Nokia for any other reason than cause, where Nokia pays compensation in lieu of notice period salary, the benefits and target short-term incentive amounts are taken into account.

The Board has discretion to implement change of control agreements if there is a period of significant instability in the business to facilitate stable and effective leadership during such a time, for example during a merger. At the end of 2018 there were no change of control agreements in place for the Group Leadership Team members.

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Remuneration of the Group Leadership Team in 2018

Remuneration of the Group Leadership Team (excluding the President and CEO) in 2018 and 2017, in the aggregate, was as follows:

	2018	2017
	EURm ¹	EURm ¹
Salary, short-term incentives and other compensation(2)	20.5	20.3
Long-term incentives(3)	3.6	7.0
Total	24.1	27.3

(1) The values represent each member's time on the Group Leadership Team.

(2) Short-term incentives represent amounts earned in respect of 2018 performance. Other compensation includes mobility related payments, local benefits and pension costs.

(3) The amounts represent the value of equity awards vesting or stock options exercised.

The members of the Group Leadership Team (excluding the President and CEO) purchased a total of 1 088 623 Nokia shares under the co-investment arrangement in May and August 2018. Consequently, these Group Leadership Team members were awarded the following equity awards under the Nokia equity program in 2018:

Award	Units awarded(1)	Grant date fair value (EUR)	Grant date	Vesting date
Awarded as regular performance share award(2)	1 531 500	6 725 123	July 4, 2018	January 1, 2021
Awarded as matching performance share award under the co-investment arrangement(2)	2 177 246	9 549 131	July 4, 2018 and October 3, 2018	January 1, 2021
Restricted shares(3)	363 700	1 594 825	July 4, 2018	October 1, 2019, 2020 and 2021

(1) Includes units awarded to persons who were Group Leadership Team members during 2018.

(2) The 2018 performance share plan has a two-year performance period based on financial targets and a one-year restriction period. There is no minimum payout at below threshold performance for executive employees. The maximum payout would be 200% subject to maximum performance against all the performance criteria. Vesting is subject to continued employment.

(3) No restricted shares were issued to the Group Leadership Team members in Europe, the award was made to a U.S. based executive in common with local practice.

Unvested equity awards held by the Nokia Group Leadership Team, including the President and CEO

The following table sets forth the potential aggregate ownership interest through the holding of equity-based incentives of the Group Leadership Team in office, including the President and CEO, as of December 31, 2018:

	Shares receivable through stock options	Shares receivable through performance shares at grant	Shares receivable through performance shares at maximum(4)	Shares receivable through restricted shares
Number of equity awards held by the Group Leadership Team(1)		8 294 556	16 589 112	734 042
% of the outstanding shares(2)	-	% 0.15	% 0.30	% 0.01
% of the total outstanding equity incentives (per instrument)(3)	-	% 11.37	% 11.37	% 20.49

(1) Includes the 14 members of the Group Leadership Team in office as of December 31, 2018. The number of units held under awards made before June 30, 2016 was adjusted to reflect the impact of the special dividend paid in 2016.

(2) The percentages are calculated in relation to the outstanding number of shares and total voting rights of Nokia as of December 31, 2018, excluding shares held by Nokia Group. No member of the Group Leadership Team owns more than 1% of the outstanding Nokia shares.

(3) The percentages are calculated in relation to the total outstanding equity incentives per instrument. The number of units outstanding under awards made before June 30, 2016 reflects the impact of the special dividend paid in 2016.

(4) At maximum performance, under the performance share plans outstanding as of December 31, 2018, the payout would be 200% and the table reflects this potential maximum payout. The restriction period for the performance share plan 2016 and the performance period for the performance share plan 2017 ended on December 31, 2018 and Nokia's performance against the performance criteria set out in the plan rules, was above the threshold performance level for both plans. The settlement to the participants under the performance share 2016 plan took place in February 2019 and the settlement for the performance share 2017 plan is expected to take place in the beginning of 2020 after the restriction period ends.

Review of our incentive plans

Each year we monitor the performance of our incentive plans against the targets for the plan, total shareholder return and the impact that the plans have on total compensation compared to market peers.

Target setting

Targets for the short-term incentives are set annually at or before the start of the year, balancing the need to deliver value with the need to motivate and drive performance of the Group Leadership Team. Targets are selected from a set of strategic metrics that align with driving sustainable value for shareholders and are set in the context market expectations and analyst consensus forecasts. Targets for our long-term incentive plans are set in a similar context.

The long-term incentive targets are set at the start of the performance period and locked in for the life of the plan.

Short-term incentives

Short-term incentive targets and achievements were based on a mix of revenue, operating profit and cash flow as well as personal targets. Targets are measured either at a Nokia Group level or, alternatively, a mix of Nokia Group and business group level for business group presidents. Payout levels for 2018 represent the challenging business environment in which Nokia has been operating with median payout at 67% of target.

Long-term incentives

We annually review of compensation against key metrics such as total shareholder return and share price to validate the effectiveness of our equity plans.

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The 2015 performance share plan vested on January 1, 2018 with 123.75% of the target award vesting based on the achievement against the revenue and earnings per share targets during the performance period (financial years 2015 and 2016).

The 2016 performance share plan vested on January 1, 2019 with 46.25% of the target award vesting based on the achievement against the revenue and earnings per share targets during the performance period (financial years 2016 and 2017).

The 2017 performance share plan will vest on January 1, 2020 with 28.9% of the target award vesting based on the achievement against the revenue and earnings per share targets during the performance period (financial years 2017 and 2018).

Pay for performance

Core to our compensation philosophy is a desire to pay for performance.

Each year we review overall total shareholder return compared to long-term incentive payouts mapping the performance of the plans against the total shareholder return curve.

Looking at the performance of our long-term incentive plans against total shareholder return there is a reasonable alignment with the performance of the plans declining as total shareholder return declines and the trend lines are reasonably aligned.

Following the change in the performance metrics in the 2018 long-term incentive plan to better fit with the needs of the business, the Board continues to actively monitor the performance of our long-term incentive plans to ensure that they deliver value for shareholders.

Our peers

In looking for suitable comparators, we have considered ourselves a European technology company and looked at businesses of similar size, global scale and complexity, such as:

ABB	Deutsche Telekom
ASML	Ericsson
Airbus	Infineon
Atos	Kone
BAe Systems	Phillips
BT	SAP
Cap Gemini	Vodafone

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Nokia Equity Program

The Nokia equity program includes the following equity instruments:

<p>Performance shares Eligible based eligibility employees</p>	<p>Restricted shares Grade-based eligibility</p>	<p>Employee share purchase plan Employees in participating countries Encourage share ownership within the Nokia employee population, increasing engagement and sense of ownership in the company</p>
<p>Purpose long-term incentive awards, to reward delivery of sustainable long-term performance, align with the interests of shareholders and aid retention of key employees</p>	<p>Purpose Limited use for recruitment and retention</p>	<p>Purpose Matching shares vest at the end of the 12 month savings period</p>
<p>Restrictions From 2019, a three-year performance period based on financial targets and one-year restriction period.</p>	<p>Restrictions Vest equally in three tranches on the 1st, 2nd and 3rd anniversary of grant</p>	<p>Restrictions n/a</p>
<p>Performance period</p>	<p>Performance period Conditions may be applied before grant of the award</p>	<p>Performance period n/a</p>

Performance share plan

In accordance with previous years' practice, the primary equity instruments granted to eligible employees are performance shares. The performance shares represent a commitment by Nokia to deliver Nokia shares to employees at a future point in time, subject to our fulfillment of the performance criteria.

Under the 2019 performance share plan, the pay-out will depend on whether the performance criteria have been met by the end of the performance period. The performance criteria are: earnings per share, free cash flow and market share (formerly called revenue relative to market). Market share is measured by comparing Nokia's revenue in constant currency to our defined primary addressable market. Data on the primary addressable market is obtained externally. The criteria excludes costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

The 2019 performance share plan has a three-year performance period (2019-2021). The number of performance shares to be settled would be determined with reference to the performance targets during the performance period. For non-executive participants, 25% of the performance shares granted in 2019 will settle after the restriction period,

regardless of the satisfaction of the applicable performance criteria. In case the applicable performance criteria are not satisfied, employees who are executives at the date of the performance share grant in 2019 will not receive any settlement.

Under the 2019 plan approved by the Board the company has authority to award up to 37 million performance shares during the year which could result in an aggregate maximum settlement of 74 million Nokia shares in the event of maximum performance being achieved.

Until the Nokia shares are delivered, the participants will not have any shareholder rights, such as voting or dividend rights associated with these performance shares.

Restricted share plan

Restricted shares are granted to Nokia's executives and other eligible employees on a more limited basis than performance shares for purposes related to retention and recruitment to ensure Nokia is able to retain and recruit vital talent for the future success of Nokia.

Under the 2019 restricted share plan, the restricted shares are divided into three tranches, each tranche consisting of one third of the restricted shares granted. The first tranche has a one-year restriction period, the second tranche a two-year restriction period, and the third tranche a three-year restriction period.

Under the 2019 plan approved by the Board the company has authority to award up to 2.5 million restricted shares during the year, which could result in a maximum settlement of 2.5 million Nokia shares.

Until the Nokia shares are delivered, the participants will not have any shareholder rights, such as voting or dividend rights, associated with the restricted shares.

Employee share purchase plan

Under our employee share purchase plan 2019 "Share in Success", eligible employees can elect to make monthly contributions from their salary to purchase Nokia shares. The aggregate maximum amount of contributions that employees can make during the plan cycle commencing in 2019 is approximately EUR 60 million. The contribution per employee cannot exceed EUR 2 100 per year. The share purchases are made at market value on predetermined dates on a quarterly basis during a 12-month savings period. Nokia intends to deliver one matching share for every two purchased shares the employee still holds at the end of the plan cycle. Participation in the plan is voluntary for all employees in countries where the plan is offered. The Employee Share Purchase Plan is planned to be offered to Nokia employees in up to 72 countries for the plan cycle commencing in 2019.

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Legacy equity programs

Stock Options

Nokia does not have any stock option plans and there are no more outstanding stock options under the earlier Nokia stock option plans.

Alcatel Lucent liquidity agreements

In 2016, Nokia and Alcatel Lucent entered into liquidity agreements with beneficiaries of the 2015 Alcatel Lucent performance share plan. Pursuant to the agreements, the 2015 Alcatel Lucent performance shares (as well as other unvested performance share plans, where the employee elected to enter into a liquidity agreement rather than accelerate their equity), would be exchanged for Nokia shares, or for the cash equivalent of the market value of such Nokia shares, shortly after expiration of the vesting period. The exchange ratio would be aligned with the exchange ratio of Nokia's exchange offer for all outstanding Alcatel Lucent securities, subject to certain adjustments in the event of financial transactions by either Nokia or Alcatel Lucent.

Authorizations and resolutions of the Board concerning remuneration

Valid authorizations

The Annual General Meeting held on May 30, 2018 resolved to authorize the Board to resolve to issue a maximum of 550 million shares through one or more issuances of shares or special rights entitling to shares. The authorization may be used to develop the company's capital structure, diversify the shareholder base, finance or carry out acquisitions or other arrangements, to settle the company's equity-based incentive plans or for other purposes resolved by the Board.

The authorization is effective until November 30, 2019 and the authorization terminated the earlier shareholder authorization for the Board to issue shares and special rights entitling to shares resolved at the Annual General Meeting on May 23, 2017. The authorization did not terminate the authorization granted by the Extraordinary General Meeting held on December 2, 2015 to the Board for the issuance of shares in order to implement the acquisition of Alcatel Lucent.

Board resolutions

On January 31, 2019, the Board approved the Nokia equity program for 2019 and the issuance, without consideration, of a maximum of 7.5 million Nokia shares held by the company to settle its commitments to Nokia's equity plan participants during 2019.

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General facts on Nokia

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General facts on Nokia

Our history

Few companies have Nokia's storied capacity for transforming, developing new technologies and adapting to shifts in market conditions. From its beginning in 1865 as a single paper mill operation, Nokia has found and nurtured success in several sectors over the years, including cable, paper products, rubber boots and tires, mobile devices and telecommunications infrastructure equipment.

Nokia's sector-by-sector success over the years has mirrored its geographical rise: from a Finnish-focused company until the 1980s with a growing Nordic and European presence; to a genuine European company in the early 1990s; and on to a truly global company from the mid-1990s onward. With our recent acquisitions of Alcatel Lucent, Gainspeed, Deepfield, and Comptel, we can deliver today a near 100% end-to-end portfolio of networks products and services on a global scale.

Nokia has been producing telecommunications equipment since the 1880s - almost since telephony began.

A storied past

When Finnish engineer Fredrik Idestam set up his initial wood pulp mill in Southern Finland in 1865, he took the first step in laying the foundation of Nokia's capacity for innovating and finding opportunity. Sensing growing pulp product demand, Idestam opened a second mill a short time later on the Nokianvirta River, inspiring him to name his company Nokia AB.

Idestam's sense of endeavor would continue to prevail in the different phases Nokia would take.

In the 1960s, Nokia became a conglomerate, comprised of rubber, cable, forestry, electronics and power generation businesses, resulting from the merger of Idestam's Nokia AB, and Finnish Cable Works Ltd, a phone and power cable producer founded in 1912, and other businesses.

Transformation anew

It was not long before transformation would occur again.

Deregulation of the European telecommunications industries in the 1980s triggered new thinking and fresh business models.

In 1982, Nokia introduced both the first fully-digital local telephone exchange in Europe and the world's first car phone for the Nordic Mobile Telephone analog standard. The breakthrough of GSM (global system for mobile communications) in the 1980s introduced more efficient use of radio frequencies and higher-quality sound. The first GSM call was made with a Nokia phone over the Nokia-built network of a Finnish operator called Radiolinja in 1991.

It was around this time that Nokia made the strategic decision to make telecommunications and mobile phones our core business. Our other businesses, including aluminum, cable, chemicals, paper, rubber, power plant, and television businesses were subsequently divested.

By 1998, Nokia was the world leader in mobile phones, a position it enjoyed for more than a decade.

And still, the business and technology worlds would continue to evolve, as would Nokia.

A shifting industry

In 2007, Nokia combined its telecoms infrastructure operations with those of Siemens to create the NSN joint venture. We later bought Siemens' stake in NSN in 2013 as the business was emerging from a successful strategy shift and the reality of what Nokia calls a Programmable World of connected devices, sensors and people was starting to take shape.

In 2011, we joined with Microsoft to strengthen our position in the highly competitive smartphone market, which in 2014 resulted in the closing of the sale of the Devices & Services business. Nokia emerged from the transaction with a firm financial footing and three strong businesses - Nokia Networks, HERE and Nokia Technologies - focused on connecting the things and people of the Programmable World.

Nokia's transformation was not complete. Our former HERE digital mapping and location services business, an arena we entered in 2006, had been a key pillar of Nokia's operational performance. However, following a strategic review of the business by the Board in light of plans to acquire Alcatel Lucent, Nokia decided to sell its HERE Business in 2015.

Acquisition of Alcatel Lucent and beyond

The acquisition of Alcatel Lucent, completed in 2016, positions Nokia as an innovation leader in next-generation technology and services.

Our reputation as an innovation powerhouse has been bolstered by the addition of Bell Labs, now known as Nokia Bell Labs. It joins a future-focused business backed by tens of thousands of engineers and thousands of patent families, a reflection of Nokia's innovation pedigree which has produced a huge array of benefits for consumers, business, and society as a whole.

The acquisition helps us shape the connectivity and digitization revolution before us - the Programmable World - in which billions of people, devices, and sensors are connected in a way that opens up a world of possibilities. These can make our planet safer, cleaner, healthier, more sustainable, more efficient and more productive.

Nokia's long history is marked by change and reinvention. We have always been excited by where technology will lead us as we seek to enable the human possibilities of a connected world. We will continue to innovate, reimagining how technology works for us discreetly while blending into, and enriching, our daily lives.

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Memorandum and Articles of Association

Registration

Nokia is organized under the laws of the Republic of Finland and registered under the business identity code 0112038. Under its current Articles of Association, Nokia's corporate purpose is to research, develop, manufacture, market, sell and deliver products, software and services in a wide range of consumer and business-to-business markets. These products, software and services relate to, among others, network infrastructure for telecommunication operators and other enterprises, the IoT, human health and well-being, multimedia, big data and analytics, mobile devices and consumer wearables and other electronics. The company may also create, acquire and license intellectual property and software as well as engage in other industrial and commercial operations, including securities trading and other investment activities. The company may carry on its business operations directly, through subsidiary companies, affiliate companies and joint ventures.

Director's voting powers

Under Finnish law, resolutions of the Board shall be made by a majority vote. A director shall refrain from taking any part in the consideration of an agreement between the director and the company or third party, or any other issue that may provide any material benefit to him or her, which may be contradictory to the interests of the company. Under Finnish law, there is no age limit requirement for directors, and there are no requirements under Finnish law that a director must own a minimum number of shares in order to qualify to act as a director. However, in accordance with the current company policy, approximately 40% of the annual fee payable to the Board members is paid in Nokia shares purchased from the market or alternatively by using treasury shares held by Nokia, and the directors shall retain until the end of their directorship such number of shares that corresponds to the number of shares they have received as Board remuneration during their first three years of service (the net amount received after deducting those shares used for offsetting any costs relating to the acquisition of the shares, including taxes).

Share rights, preferences and restrictions

Each share confers the right to one vote at general meetings. According to Finnish law, a company generally must hold an Annual General Meeting called by the Board within six months from the end of the fiscal year. Additionally, the Board is obliged to call an Extraordinary General Meeting, whenever such meeting is deemed necessary, or at the request of the auditor or shareholders representing a minimum of one-tenth of all outstanding shares. Under our Articles of Association, the Board is elected at least annually at the Annual General Meeting of the shareholders for a term ending at the end of the next Annual General Meeting.

Under Finnish law, shareholders may attend and vote at general meetings in person or by proxy. It is not customary in Finland for a company to issue forms of proxy to its shareholders. Accordingly, Nokia does not do so. However, registered holders and beneficial owners of ADSs are issued forms of proxy by the Depositary.

To attend and vote at a general meeting, a shareholder must be registered in the register of shareholders in the Finnish book-entry system on or prior to the record date set forth in the notice of the general meeting. A registered holder or a beneficial owner of the ADSs, like other beneficial owners whose shares are registered in the company's register of shareholders in the name of a nominee, may vote with their shares provided that they arrange to have their name entered in the temporary register of shareholders for the general meeting.

The record date is the eighth business day preceding the meeting. To be entered in the temporary register of shareholders for the general meeting, a holder of ADSs must provide the Depositary, or have his broker or other custodian provide the Depositary, on or before the voting deadline, as defined in the proxy material issued by the

Depositary, a proxy with the following information: the name, address, and social security number or another corresponding personal identification number of the holder of the ADSs, the number of shares to be voted by the holder of the ADSs and the voting instructions. The register of shareholders as of the record date of each general meeting is public until the end of the respective meeting. Other nominee registered shareholders can attend and vote at the general meetings by instructing their broker or other custodian to register the shareholder in Nokia's temporary register of shareholders and give the voting instructions in accordance with the broker's or custodian's instructions.

By completing and returning the form of proxy provided by the Depositary, a holder of ADSs also authorizes the Depositary to give notice to us, required by our Articles of Association, of the holder's intention to attend the general meeting.

Each of our shares confers equal rights to share in the distribution of the company's funds. Dividend entitlement lapses after three years if a dividend remains unclaimed for that period, in which case the unclaimed dividend will be retained by Nokia.

Under Finnish law, the rights of shareholders are related to the shares as set forth in law and our Articles of Association. Neither Finnish law nor our Articles of Association sets limitations on the rights to own Nokia securities, including the rights of foreign shareholders to hold or exercise voting rights in the said securities. Amendment of the Articles of Association requires a decision of the general meeting, supported by two-thirds of the votes cast and two-thirds of the shares represented at the meeting.

Disclosure of shareholder ownership or voting power

According to the Finnish Securities Market Act, a shareholder shall disclose their ownership or voting power to the company and the Finnish Financial Supervisory Authority when the ownership or voting power reaches, exceeds or falls below 5, 10, 15, 20, 25, 30, 50 or 90% of all the shares or the voting rights outstanding. The term "ownership" includes ownership by the shareholder, as well as selected related parties, and calculating the ownership or voting power covers agreements or other arrangements, which when concluded would cause the proportion of voting rights or number of shares to reach, exceed or fall below the aforementioned limits. Upon receiving such notice, the company shall disclose it by a stock exchange release without undue delay.

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Purchase obligation

Our Articles of Association require a shareholder that holds one-third or one-half of all of our shares to purchase the shares of all other shareholders that so request. A shareholder who becomes subject to the purchase obligation is also obligated to purchase any subscription rights, stock options or convertible bonds issued by the company if so requested by the holder. The purchase price of the shares under our Articles of Association is the higher of: (a) the weighted average trading price of the shares on Nasdaq Helsinki during the ten business days prior to the day on which we have been notified by the purchaser that its holding has reached or exceeded the threshold referred to above or, in the absence of such notification or its failure to arrive within the specified period, the day on which our Board otherwise becomes aware of this; or (b) the average price, weighted by the number of shares, which the purchaser has paid for the shares it has acquired during the last 12 months preceding the date referred to in (a).

Under the Finnish Securities Market Act, a shareholder whose voting power exceeds 30% or 50% of the total voting rights in a company shall, within one month, offer to purchase the remaining shares of the company, as well as any other rights entitling to the shares issued by the company, such as subscription rights, convertible bonds or stock options issued by the company. The purchase price shall be the market price of the securities in question. Subject to certain exceptions, the market price is determined on the basis of the highest price paid for the security during the preceding six months by the shareholder or any party in close connection to the shareholder. Subject to certain exceptions, if the shareholder or any related party has not during the six months preceding the offer acquired any securities that are the target for the offer, the market price is determined based on the average of the prices paid for the security in public trading during the preceding three months weighted by the volume of trade.

Under the Finnish Companies Act, a shareholder whose holding exceeds nine-tenths of the total number of shares or voting rights in Nokia has both the right and, upon a request from the minority shareholders, the obligation to purchase all the shares of the minority shareholders for the then current market price. The market price is determined, among other things, on the basis of the recent market price of the shares. The purchase procedure under the Finnish Companies Act differs, and the purchase price may differ, from the purchase procedure and price under the Finnish Securities Market Act, as discussed above. However, if the threshold of nine-tenths has been exceeded through either a mandatory or a voluntary public offer pursuant to the Finnish Securities Market Act, the market price under the Finnish Companies Act is deemed to be the price offered in the public offer, unless there are specific reasons to deviate from it.

Pre-emptive rights

In connection with any offering of shares, the existing shareholders have a pre-emptive right to subscribe for shares offered in proportion to the amount of shares in their possession. However, a general meeting of shareholders may vote, by a majority of two-thirds of the votes cast and two-thirds of the shares represented at the meeting, to waive this pre-emptive right provided that, from the company's perspective, weighty financial grounds exist.

Under the Finnish Act on the Monitoring of Foreign Corporate Acquisitions (2012/172 as amended), a notification to the Ministry of Economic Affairs and Employment is required for a non-resident of Finland, directly or indirectly, when acquiring one-tenth or more of the voting power or corresponding factual influence in a company. The Ministry of Economic Affairs and Employment has to confirm the acquisition unless the acquisition would jeopardize important national interests, in which case the matter is referred to the Council of State. If the company in question is operating in the defense sector, an approval by the Ministry of Economic Affairs and Employment is required before the acquisition is made. These requirements are not applicable if, for instance, the voting power is acquired in a share issue that is proportional to the holder's ownership of the shares. Moreover, the requirements do not apply to residents of countries in the European Economic Area or EFTA countries.

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Selected financial data

Five-year consolidated financial information

The selected financial data set forth below as of and for each of the years in the five-year period ended December 31, 2018 has been derived from, and should be read in conjunction with, our consolidated financial statements prepared in accordance with IFRS. The consolidated financial statements as of December 31, 2018 and 2017 and for the years ended December 31, 2018, 2017 and 2016 are included in this annual report on Form 20-F.

In 2018 the Group applied IFRS 9, Financial Instruments, and IFRS 15, Contracts with Customers, for the first time. As the new standards were not adopted retrospectively, the financial information for the comparative periods has not been restated for the effects of the new standards. Refer to Note 3, New and amended standards and interpretations, in the consolidated financial statements included in this annual report on Form 20-F. In January 2016, the Group acquired Alcatel Lucent; consequently the acquisition is reflected in the selected financial data presented as of and for the years ended December 31, 2018, 2017 and 2016 only.

	2018 USDm(1)	2018 EURm	2017	2016	2015	2014
For the year ended December 31						
From the consolidated income statement						
Net sales	26 647	22 563	23 147	23 641	12 560	11 762
Operating (loss)/profit	(70)	(59)	16	(1 100)	1 697	1 414
(Loss)/profit before tax	(425)	(360)	(510)	(1 369)	1 540	999
(Loss)/profit for the year from Continuing operations	(648)	(549)	(1 437)	(912)	1 194	2 718
Profit/(loss) for the year from Discontinued operations	253	214	(21)	(15)	1 274	758
(Loss)/profit for the year	(396)	(335)	(1 458)	(927)	2 468	3 476
(Loss)/profit from Continuing operations attributable to equity holders of the parent	(654)	(554)	(1 473)	(751)	1 192	2 710
(Loss)/profit attributable to equity holders of the parent	(402)	(340)	(1 494)	(766)	2 466	3 462
Earnings per share attributable to equity holders of the parent						
Basic earnings per share, EUR						
Continuing operations	(0.12)	(0.10)	(0.26)	(0.13)	0.32	0.73
(Loss)/profit for the year	(0.07)	(0.06)	(0.26)	(0.13)	0.67	0.94
Diluted earnings per share, EUR						
Continuing operations	(0.12)	(0.10)	(0.26)	(0.13)	0.31	0.67
(Loss)/profit for the year	(0.07)	(0.06)	(0.26)	(0.13)	0.63	0.85
Cash dividends per share, EUR(2)	0.24	0.20	0.19	0.17	0.26	0.14
Average number of shares (millions of shares)						
Basic	5 588	5 588	5 652	5 732	3 671	3 699
Diluted						
Continuing operations	5 588	5 588	5 652	5 741	3 949	4 132
(Loss)/profit for the year	5 588	5 588	5 652	5 741	3 949	4 132

(1) In 2018, average rate of USD per EUR 1.1810 has been used to translate the consolidated income statement items.

(2) Planned maximum annual distribution for 2018 is EUR 0.20 per share to be paid quarterly subject to shareholders' and the Board of Directors' approval.

	2018 USDm(1)	2018 EURm	2017	2016	2015	2014
As of December 31						
From the consolidated statement of financial position						
Non-current assets(2)	24 327	21 246	21 160	24 182	5 102	7 339
Total cash and current financial investments(2)(3)	7 870	6 873	8 280	9 326	9 849	7 715
Other current assets	13 045	11 393	11 561	11 349	5 975	6 009
Assets held for sale	6	5	23	44	–	–
Total assets	45 247	39 517	41 024	44 901	20 926	21 063
Capital and reserves attributable to equity holders of the parent	17 506	15 289	16 138	20 094	10 503	8 611
Non-controlling interests	94	82	80	881	21	58
Long-term interest-bearing liabilities	3 238	2 828	3 457	3 657	2 023	2 576
Other non-current liabilities	8 260	7 214	8 605	7 664	1 988	2 530
Short-term interest-bearing liabilities	1 138	994	309	370	51	116
Other current liabilities	15 011	13 110	12 435	12 235	6 340	7 172
Total shareholders' equity and liabilities	45 247	39 517	41 024	44 901	20 926	21 063
Net cash and current financial investments(2)(4)	3 493	3 051	4 514	5 299	7 775	5 023
Share capital	282	246	246	246	246	246

(1) In 2018, end of period rate of USD per EUR 1.1450 has been used to translate the consolidated statement of financial position items.

(2) Related to the adoption of IFRS 9, Financial Instruments on January 1, 2018, financial instruments previously presented within "Available for sale investments" are now presented within "Non-current financial investments", and financial instruments previously presented within "Available for sale investments, liquid assets" and "Investments at fair value through profit and loss, liquid assets" are now presented within "Current financial investments". Despite the changes in the presentation of comparatives, IFRS 9 has not been adopted retrospectively.

(3) Total cash and current financial investments consist of the following line items from our consolidated statement of financial position: cash and cash equivalents and current financial investments.

(4) Net cash and current financial investments equal total cash and current financial investments less long-term and short-term interest-bearing liabilities.

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Shares

Shares and share capital

Nokia has one class of shares. Each Nokia share entitles the holder to one vote at General Meetings of Nokia.

As of December 31, 2018, the share capital of Nokia Corporation equaled EUR 245 896 461.96 and the total number of shares issued was 5 635 945 159. As of December 31, 2018, the total number of shares included 42 782 966 shares owned by Group companies representing approximately 0.8% of the total number of shares and the total voting rights.

Nokia does not have minimum or maximum share capital or a par value of a share.

As of December 31	2018	2017	2016	2015	2014
Share capital, EURm	246	246	246	246	246
Shares, (000s)	5 635 945	5 839 404	5 836 055	3 992 864	3 745 044
Shares owned by the Group, (000s)	42 783	259 887	115 552	53 669	96 901
Number of shares excluding shares owned by the Group, (000s)	5 593 162	5 579 517	5 720 503	3 939 195	3 648 143
Average number of shares excluding shares owned by the Group during the year, (000s), basic(1)	5 588 020	5 651 814	5 732 371	3 670 934	3 698 723
Average number of shares excluding shares owned by the Group during the year, (000s), diluted(1)	5 588 020	5 651 814	5 741 117	3 949 312	4 131 602
Number of registered shareholders(2)	243 409	247 717	237 700	209 509	216 830

(1) Used in calculation of earnings per share for profit or loss for the year attributable to equity holders of the parent.

(2) Each account operator is included in the figure as only one registered shareholder.

Key ratios

For the year ended December 31, Continuing operations	2018	2017	2016	2015	2014
Earnings per share for (loss)/profit attributable to equity holders of the parent					
Earnings per share, basic, EUR	(0.10)	(0.26)	(0.13)	0.32	0.73
Earnings per share, diluted, EUR	(0.10)	(0.26)	(0.13)	0.31	0.67
P/E ratio, basic(1)	neg.	neg.	neg.	20.63	8.99
Dividend per share, EUR(2)	0.20	0.19	0.17	0.26	0.14
Total dividends paid, EURm(2)(3)	1 119	1 063	963	1 501	511
Payout ratio, basic(2)	neg.	neg.	neg.	0.81	0.19
Dividend yield, %(1)(2)	3.98	4.88	3.70	3.94	2.13
As of December 31	2018	2017	2016	2015	2014
Shareholders' equity per share, EUR(4)	2.73	2.89	3.51	2.67	2.36
Market capitalization, EURm(1)(4)	28 134	21 704	26 257	25 999	23 932

(1) Based on Nokia closing share price at year-end.

(2) Planned maximum annual distribution for 2018 is EUR 0.20 per share to be paid quarterly subject to shareholders' and the Board of Directors' approval.

(3) For 2018, the figure represents the maximum amount to be distributed as dividends, based on the number of shares as of December 31, 2018, excluding the number of shares owned by the Group companies. Comparative figures represent the total actual amounts paid.

(4) Excludes shares owned by Group companies.

Share turnover

For the year ended December 31	2018	2017	2016	2015	2014
Share turnover (000s)(1)	8 960 687	8 839 680	9 604 722	8 490 823	9 278 853
Total number of shares (000s)	5 635 945	5 839 404	5 836 055	3 992 823	3 745 044
% of total number of shares	159	151	165	213	248

(1) Source: Nasdaq Helsinki, the NYSE composite tape and Euronext Paris (since November 2015).

The principal trading markets for the shares are Nasdaq Helsinki and Euronext Paris, in the form of shares, and the NYSE, in the form of ADSs.

Share price development

Annual data	Nasdaq Helsinki			New York Stock Exchange			Euronext Paris		
	High	Low	Value	High	Low	Value	High	Low	Value
	EUR			USD			EUR		
2018 Full year High/Low	5.39	3.85		6.41	4.68		5.39	3.85	
2018 Full year Average (Volume-weighted)			4.74			5.63			4.62
Year-end value December 31, 2018			5.03			5.82			5.06
Year-end value December 31, 2017			3.89			4.66			3.89
Change from December 31, 2017 to December 31, 2018			29.2%			24.9%			30.0%

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Stock option exercises 2014-2018

Year	Stock option category	Subscription price EUR	Number of new shares 000s	Date of payment	Net proceeds EURm	New share capi EURm	
2014	Nokia Stock Option Plan 2009 1Q	9.56	0	2014	0.00	–	
	Nokia Stock Option Plan 2009 2Q	10.92	0	2014	0.00	–	
	Nokia Stock Option Plan 2009 3Q	9.02	0	2014	0.00	–	
	Nokia Stock Option Plan 2009 4Q	8.50	0	2014	0.00	–	
	Nokia Stock Option Plan 2010 1Q	9.85	0	2014	0.00	–	
	Nokia Stock Option Plan 2010 2Q	8.60	0	2014	0.00	–	
	Nokia Stock Option Plan 2010 3Q	7.03	0	2014	0.00	–	
	Nokia Stock Option Plan 2010 4Q	7.33	0	2014	0.00	–	
	Nokia Stock Option Plan 2011 2Q	5.76	50	2014	0.29	–	
	Nokia Stock Option Plan 2011 3Q	3.50	0	2014	0.00	–	
	Total			50		0.29	
	2015	Nokia Stock Option Plan 2010 1Q	9.85	0	2015	0.00	–
		Nokia Stock Option Plan 2010 2Q	8.60	0	2015	0.00	–
		Nokia Stock Option Plan 2010 3Q	7.03	0	2015	0.00	–
		Nokia Stock Option Plan 2010 4Q	7.33	0	2015	0.00	–
		Nokia Stock Option Plan 2011 2Q	5.76	442	2015	2.55	–
		Nokia Stock Option Plan 2011 3Q	3.50	212	2015	0.74	–
Nokia Stock Option Plan 2011 4Q		4.58	90	2015	0.41	–	
Nokia Stock Option Plan 2012 1Q		3.58	0	2015	0.00	–	
Nokia Stock Option Plan 2012 2Q		2.18	213	2015	0.47	–	
Nokia Stock Option Plan 2012 3Q		1.92	285	2015	0.55	–	
Total				1242		4.72	
2016		Nokia Stock Option Plan 2011 2Q	5.66	104	2016	0.60	–

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	Nokia Stock Option Plan 2011 3Q	3.40	0	2016	0.00	—
	Nokia Stock Option Plan 2011 4Q	4.48	0	2016	0.00	—
	Nokia Stock Option Plan 2012 1Q	3.48	0	2016	0.00	—
	Nokia Stock Option Plan 2012 2Q	2.08	240	2016	0.51	—
	Nokia Stock Option Plan 2012 3Q	1.82	308	2016	0.57	—
	Nokia Stock Option Plan 2012 4Q	1.76	10	2016	0.02	—
	Nokia Stock Option Plan 2013 1Q	2.58	0	2016	0.00	—
	Nokia Stock Option Plan 2013 2Q	2.35	166	2016	0.39	—
	Nokia Stock Option Plan 2013 3Q	2.72	5	2016	0.01	—
	Total		833		2.10	
2017	Nokia Stock Option Plan 2011 2Q	5.66	0	2017	0.00	—
	Nokia Stock Option Plan 2011 3Q	3.40	0	2017	0.00	—
	Nokia Stock Option Plan 2011 4Q	4.48	5	2017	0.02	—
	Nokia Stock Option Plan 2012 1Q	3.48	0	2017	0.00	—
	Nokia Stock Option Plan 2012 2Q	2.08	61	2017	0.13	—
	Nokia Stock Option Plan 2012 3Q	1.82	148	2017	0.27	—
	Nokia Stock Option Plan 2012 4Q	1.76	9	2017	0.02	—
	Nokia Stock Option Plan 2013 1Q	2.58	0	2017	0.00	—
	Nokia Stock Option Plan 2013 2Q	2.35	193	2017	0.45	—
	Nokia Stock Option Plan 2013 3Q	2.72	0	2017	0.00	—
	Nokia Stock Option Plan 2013 4Q	5.41	0	2017	0.00	—
	Total		416		0.89	
2018	Nokia Stock Option Plan 2012 1Q	3.48	0	2018	0.00	—
	Nokia Stock Option Plan 2012 2Q	2.08	128	2018	0.27	—
	Nokia Stock Option Plan 2012 3Q	1.82	170	2018	0.31	—
	Nokia Stock Option Plan 2012 4Q	1.76	0	2018	0.00	—
		2.58	0	2018	0.00	—

Nokia Stock Option Plan 2013 1Q					
Nokia Stock Option Plan 2013 2Q	2.35	127	2018	0.30	—
Nokia Stock Option Plan 2013 3Q	2.72	0	2018	0.00	—
Nokia Stock Option Plan 2013 4Q	5.41	0	2018	0.00	—
Total		425		0.87	

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Shareholders

As of December 31, 2018, shareholders registered in Finland represented approximately 21% and shareholders registered in the name of a nominee represented approximately 79% of the total number of shares of Nokia Corporation. The number of directly registered shareholders was 243 409 as of December 31, 2018. Each account operator (13) is included in this figure as only one registered shareholder.

Largest shareholders registered in Finland as of December 31, 2018(1)

Shareholder	Total number of shares 000s	% of all shares	% of all voting rights
Solidium Oy	206 000	3.66	3.66
Keskinäinen Työeläkevakuutusyhtiö Varma	67 222	1.19	1.19
Valtion Eläkerahasto	37 000	0.66	0.66
Keskinäinen Eläkevakuutusyhtiö Ilmarinen	36 750	0.65	0.65
Schweizerische Nationalbank	25 485	0.45	0.45
Keskinäinen Työeläkevakuutusyhtiö Elo	17 100	0.30	0.30
Lival Oy Ab	16 240	0.29	0.29
OP-Suomi-Sijoitusrahasto	15 739	0.28	0.28
Svenska Litteratursällskapet i Finland rf	15 678	0.28	0.28
KEVA	12 356	0.22	0.22

(1) Excluding nominee registered shares and shares owned by Nokia Corporation. Nokia Corporation owned 42 782 966 shares as of December 31, 2018.

Breakdown of share ownership as of December 31, 2018(1)

By number of shares owned	Number of shareholders	% of shareholders	Total number of shares	% of all shares
1–100	51 767	21.27	2 881 948	0.05
101–1 000	116 445	47.84	52 935 062	0.94
1 001–10 000	66 101	27.16	206 362 853	3.66
10 001–100 000	8 551	3.51	209 722 973	3.72
100 001–500 000	427	0.18	85 068 579	1.51
500 001–1 000 000	38	0.02	27 161 167	0.48
1 000 001–5 000 000	56	0.02	118 984 665	2.11
Over 5 000 000	24	0.01	4 932 827 912	87.52
Total	243 409	100.00	5 635 945 159	100.00

(1) The breakdown covers only shareholders registered in Finland, and each account operator (13) is included in the number of shareholders as only one registered shareholder. As a result, the breakdown is not illustrative of the entire shareholder base of Nokia.

By nationality % of shares

Non-Finnish shareholders	79.22
Finnish shareholders	20.78
Total	100.00

By shareholder category (Finnish shareholders)	% of shares
Corporations	2.26
Households	8.21
Financial and insurance institutions	2.18
Non-profit organizations	1.20
Governmental bodies (incl. pension insurance companies)	6.93
Total	20.78

As of December 31, 2018, a total of 663 102 934 ADSs (equivalent to the same number of shares or approximately 11.77% of the total outstanding shares) were outstanding and held of record by 126 586 registered holders in the United States. We are aware that many ADSs are held of record by brokers and other nominees, and accordingly the above number of holders is not necessarily representative of the actual number of persons who are beneficial holders of ADSs or the number of ADSs beneficially held by such persons. Based on information available from Automatic Data Processing Inc., the number of beneficial owners of ADSs as of December 31, 2018 was 413 650.

Based on information known to us as of February 5, 2019, as of December 31, 2018 Blackrock, Inc. beneficially owned 300 482 139 Nokia shares, which at that time corresponded to approximately 5.3% of the total number of shares and voting rights of Nokia.

To the best of our knowledge, Nokia is not directly or indirectly owned or controlled by any other corporation or any government, and there are no arrangements that may result in a change of control of Nokia.

Shares and stock options owned by the members of the Board and the Nokia Group Leadership Team

As of December 31, 2018, the members of our Board and the Group Leadership team held a total of 7 223 008 shares and ADSs in Nokia, which represented approximately 0.13% of our outstanding shares and total voting rights excluding shares held by the Nokia Group.

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Offer and listing details

Our capital consists of shares traded on Nasdaq Helsinki under the symbol “NOKIA” and Euronext Paris under the symbol “NOKIA”. Our ADSs, each representing one of our shares, are traded on the NYSE under the symbol “NOK”. The ADSs are evidenced by American Depositary Receipts (ADRs) issued by Citibank, N.A.

American Depositary Shares

Fees and charges

ADS holders may have to pay the following service fees to the Depositary:

Service	Fees, USD
Issuance of ADSs	Up to 5 cents per ADS(1)
Cancellation of ADSs	Up to 5 cents per ADS(1)
Distribution of cash dividends or other cash distributions	Up to 2 cents per ADS(2)
Distribution of ADSs pursuant to (i) stock dividends, free stock distributions or (ii) exercises of rights to purchase additional ADSs	Up to 5 cents per ADS(2)
Distribution of securities other than ADSs or rights to purchase additional ADSs	Up to 5 cents per ADS(1)
ADS transfer fee	1.50 per transfer(1)

(1) These fees are typically paid to the Depositary by the brokers on behalf of their clients receiving the newly issued ADSs from the Depositary and by the brokers on behalf of their clients delivering the ADSs to the Depositary for cancellation. The brokers in turn charge these transaction fees to their clients.

(2) In 2018, the Depositary did not collect these fees. However, for 2019 a dividend fee is intended to be implemented for ADSs. Such fees are offset against the related distribution made to the ADS holder.

Additionally, ADS holders are responsible for certain fees and expenses incurred by the Depositary on their behalf and certain governmental charges such as taxes and registration fees, transmission and delivery expenses, conversion of foreign currency and fees relating to compliance with exchange control regulations. The fees and charges may vary over time.

In the event of refusal to pay the depositary fees, the Depositary may, under the terms of the deposit agreement, refuse the requested service until payment is received or may set-off the amount of the depositary fees from any distribution to be made to the ADS holder.

Payments

In 2018, our Depositary made the following payments on our behalf in relation to our ADS program.

Category	Payment, USD
Settlement infrastructure fees (including the Depositary Trust Company fees)	876 594.79
Proxy process expenses (including printing, postage and distribution)	877 171.52

ADS holder identification expenses	98 753.96
Legal fees	—
NYSE listing fees	500 000.00
Total	2 352 520.27

Additionally for 2018, our Depositary reimbursed us USD 950,000 mainly related to contributions towards our investor relations activities, including investor meetings and conferences and fees of investor relations service vendors, and other miscellaneous expenses related to the United States listing of our ADSs.

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Production of infrastructure equipment and products

Our operations team handles the supply chain management of all its hardware, software and original equipment manufacturer products. This includes supply planning, manufacturing, distribution, procurement, logistics and supply.

On December 31, 2018, we had ten manufacturing facilities globally: one in Australia, one in Brazil, one in China, one in Finland, two in France, one in Germany, one in India, one in the United Kingdom and one in the United States.

Most of our production and assembly is outsourced, while the remaining portion is carried out in our production sites. This system provides us with considerable flexibility in our manufacturing and enables us to meet demands related to cost, availability and customer requirements more easily.

The table below shows the productive capacity per location of significant manufacturing facilities for our infrastructure equipment on December 31, 2018.

Country	Location and products(1)	Productive capacity, Net (m2)(2)
Australia	Kilsyth: radio frequency systems	5 400
Brazil	Embu: radio frequency systems	7 800
China	Suzhou: radio frequency systems	12 500
Finland	Oulu: base stations	13 800
France	Calais: submarine cables	63 000
France	Trignac: radio frequency systems	7 500
Germany	Hannover: radio frequency systems	20 300
India	Chennai: base stations, radio controllers and transmission systems	12 000
UK	Greenwich: submarine cables	19 500
USA	Meriden: radio frequency systems	31 000

(1) We consider the production capacity of our manufacturing network to be sufficient to meet the requirements of our network infrastructure business. The extent of utilization of our manufacturing facilities varies from plant to plant and from time to time during the year. None of these facilities is subject to a material encumbrance.

(2) Productive capacity equals the total area allotted to manufacturing and to the storage of manufacturing-related materials.

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Controls and procedures

Our management, with the participation of our President and CEO and our Chief Financial Officer, conducted an evaluation pursuant to Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act), of the effectiveness of our disclosure controls and procedures as of December 31, 2018. Based on such evaluation, our President and CEO and our Chief Financial Officer have concluded that our disclosure controls and procedures were effective.

Disclosure controls and procedures mean controls and other procedures that are designed to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, and that such information required to be disclosed by us in the reports that we file or submit under the Exchange Act is accumulated and communicated to our management, including our President and CEO and our Chief Financial Officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosures.

Management's annual report on internal control over financial reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting for Nokia. Our internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation and fair presentation of published financial statements. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Our management evaluated the effectiveness of our internal control over financial reporting using the criteria described in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this evaluation, our management has assessed the effectiveness of Nokia's internal control over financial reporting at December 31, 2018 and concluded that such internal control over financial reporting is effective.

The effectiveness of our internal control over financial reporting as of December 31, 2018 has been audited by PricewaterhouseCoopers Oy, an independent registered public accounting firm. Refer to "Report of independent registered public accounting firm" of this Annual Report on Form 20-F.

Changes in internal control over financial reporting

There have been no changes in our internal control over financial reporting during 2018, other than the remediation of a material weakness identified during the year referred to below, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

During Q3 2018, management identified a material weakness in the design of controls related to the reporting of contract assets, contract liabilities and related balances in accordance with IFRS 15 Revenue from Contracts with Customers. The original control design, implemented in Q1 2018, did not adequately incorporate the precision necessary to evaluate contract related balances to present contract assets and liabilities in a materially accurate manner. Note, that this material weakness does not relate to the 2017 financial statements.

Upon identification of the material weakness, management implemented a remediation plan to 1) redesign the related internal controls to focus on contract level balances, 2) provide additional technical training to control operators and

3) provide enhanced information technology reports at a contract level. Collectively, this remediation plan enhanced the precision of the internal controls surrounding the reporting of contract assets, contract liabilities and related balances, in accordance with IFRS 15.

As of December 31, 2018, management has concluded that these redesigned controls have operated effectively for a reasonable period of time, and therefore have concluded that this material weakness has been remediated.

Attestation report of the registered public accounting firm

Refer to “Report of independent registered public accounting firm” of this Annual Report on Form 20-F.

Exchange controls

There are currently no Finnish laws which may affect the import or export of capital, or the remittance of dividends, interest or other payments.

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Government regulation

Nokia and its businesses are subject to direct and indirect regulation in each of the countries in which we, the companies with which we work and our customers do business. As a result, changes in or uncertainties related to various types of regulations applicable to current or new technologies, intellectual property, products and services could affect our business adversely. Moreover, the implementation of technological or legal requirements could impact our products and services, technology and patent licensing activities, manufacturing and distribution processes, and could affect the timing of product and services introductions and the cost of our production, products and services, as well as their commercial success. Also, our business is subject to the impacts of changes in economic and trade policies or regulation favoring the local industry participants, as well as other measures with potentially protectionist objectives that the host governments in different countries may take. Export control, tariffs or other fees or levies imposed on our products and services, environmental, product safety and security and other regulations that adversely affect the export, import, pricing or costs of our products and services as well as export prohibitions (sanctions) enacted by the EU, the United States or other countries or regions could adversely affect our net sales and results of operations.

For example, in the United States, our products and services are subject to a wide range of government regulations that might have a direct impact on our business, including, but not limited to, regulation related to product certification, standards, spectrum management, provision of telecommunications services, privacy and data protection, competition and sustainability. The EU-level or local member state regulation has a direct impact on many areas of our business, markets and customers within the EU. The European regulation influences, for example, conditions for innovation for telecommunications infrastructure and internet and related services, as well as technology and patent licensing; investment in fixed and wireless broadband communication infrastructure and operation of global data flows. Additionally, with respect to certain developing market countries, the business environment we operate in can be affected by protectionist regulation.

We are in continuous dialog with relevant state agencies, regulators and other decision makers through our government relations representatives in various geographies through our experts, industry associations and representatives in order to proactively exchange views and address the impact of any planned changes to the regulatory environment on our business activities.

Sales in United States-sanctioned countries

General

We are a global company and have sales in most countries of the world. Nokia is committed to the highest standards of ethical conduct, and adheres to all applicable national and international trade-related laws. As a leading international telecommunications company with global operations, Nokia has a presence also in countries subject to international sanctions. All operations of Nokia, and in particular any operations undertaken in countries targeted by sanctions, are conducted in accordance with our comprehensive and robust Internal Compliance Program to ensure that they are in full compliance with all applicable laws and regulations.

We cannot exclude the possibility that third parties may unlawfully divert our products to these countries from other countries in which we sell them, or that, for services distributed through the internet, third parties could have accessed them in markets or countries for which they are not intended by circumventing the industry standard protective mechanisms, such as IP address blocks, despite our efforts in implementing measures to prevent such actions.

Disclosure pursuant to Section 219 of the Iran Threat Reduction and Syria Human Rights Act of 2012

We operate in Iran in compliance with applicable economic sanctions and other trade-related laws. We provide telecommunications equipment with ancillary services to various network operator customers and internet service providers through our Networks business. We do not deliver equipment and services to Iran for military purposes, or for the purpose of limiting political discourse, blocking legitimate forms of free speech or conducting surveillance of individuals.

In connection with the business activities relating to Iran, we have two local offices in Iran that employed approximately 80 employees at the end of 2018 through a branch of a Finnish subsidiary and four employees through a branch of Alcatel Lucent International. Nokia is the controlling shareholder in Pishahang Communications Network Development Company (Pishahang). The other minority shareholder in Pishahang is Information Technology Application Development TACFAM Company (Tacfam). Pishahang has been historically the contracting entity for Nokia in Nokia's transactions with MTN Irancell, and Pishahang has not pursued, nor does it intend to pursue any other business. In 2018, Nokia entered a two-step transaction with Tacfam, pursuant to which Nokia diluted the stake of Tacfam in Pishahang via a debt conversion into equity. The first step was completed in 2018 and the second step is expected to be completed in 2019. Upon completion of the second step of this transaction, Nokia will have a 90% interest in Pishahang and Tacfam will have a 10% interest.

We continue to maintain routine contacts with governmental agencies in Iran as required, for example, to maintain a legal presence and office facilities in Iran, pay taxes and employ Iranian nationals.

To our knowledge, none of our sales in Iran in 2018 are required to be disclosed pursuant to ITRA Section 219, with the possible exception of the following:

In 2018, we provided radio, core and transmission equipment, including associated services, to Iranian mobile network operators, Mobile Communications Company of Iran (MCCI) and MTN Irancell, and to one local internet service provider HiWeb. We also provided some services to local fixed networks operators, Telecommunication Company of Iran (TCI) and, through a local prime contractor Maskan va Omran Quds Razavi Company, to Telecommunication Infrastructure Company of Iran (TIC). Also, RFS, a wholly owned subsidiary of NSB, has in 2018 sold wireless infrastructure products through an Iranian distributor, FourSat Kish. Additionally, in 2018, we purchased certain fixed line telephony services from TCI and mobile phone subscriptions from MCCI.

Although it is difficult to evaluate with any reasonable degree of certainty, we have concluded that we cannot exclude the possibility that MCCI, MTN Irancell, TCI, TIC, HiWeb, FourSat Kish or Tacfam is owned or controlled, directly or indirectly, by the government of Iran. None of these activities involve U.S. affiliates of Nokia, or any persons from the United States.

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Nokia does not normally allocate net profit on a country-by-country or activity-by-activity basis, other than as set forth in Nokia's consolidated financial statements prepared in accordance with IFRS. Therefore, for this exercise Nokia will reflect its sales margin in lieu of the net profit / loss. In 2018, we recognized net sales of EUR 11.5 million and a positive sale margin of EUR 6.33 million from business with MCCI, net sales of EUR 35.28 million and a negative sale margin of EUR 8.33 million from business with MTN Irancell, net sales of EUR 2.03 million and a negative sale margin of EUR 0.24 million from business with TCI, as well as net sales of EUR 0 million and a positive sale margin of EUR 1.79 million from business with TIC. Furthermore, we recognized net sales of EUR 5.68 million and a positive sale margin of EUR 3.17 million from business with HiWeb. Moreover, RFS recognized sales revenue of approximately EUR 0.09 million, and positive sale margin of EUR 0.01 million from business with FourSat Kish.

Although we evaluate our business activities on an ongoing basis, we currently do not intend to accept any new business in Iran in 2019 and intend to only complete existing contractual obligations in Iran in compliance with applicable economic sanctions and other trade-related laws.

Taxation

General

The statements of the United States and Finnish tax laws set out below are based on the laws in force as of the date of this annual report on Form 20 F and may be subject to any changes in the United States or Finnish law, and in any double taxation convention or treaty between the United States and Finland, occurring after that date, possibly with retroactive effect.

For purposes of this summary, beneficial owners of ADSs that hold the ADSs as capital assets and that are considered residents of the United States for purposes of the current income tax convention between the United States and Finland, signed on September 21, 1989 (as amended by a protocol signed on May 31, 2006), referred to as the "Treaty", and that are entitled to the benefits of the Treaty under the "Limitation on Benefits" provisions contained in the Treaty, are referred to as "U.S. Holders". Beneficial owners that are citizens or residents of the United States, corporations created in or organized under U.S. law, and estates or trusts (to the extent their income is subject to U.S. tax either directly or in the hands of beneficiaries) generally will be considered to be residents of the United States under the Treaty. Special rules apply to U.S. Holders that are also residents of Finland and to citizens or residents of the United States that do not maintain a substantial presence, permanent home or habitual abode in the United States. For purposes of this discussion, it is assumed that the Depositary and its custodian will perform all actions as required by the deposit agreement with the Depositary and other related agreements between the Depositary and Nokia.

If a partnership holds ADSs (including for this purpose any entity or arrangement treated as a partnership for U.S. federal income tax purposes), the tax treatment of a partner will depend upon the status of the partner and activities of the partnership. If a U.S. Holder is a partnership or a partner in a partnership that holds ADSs, the holder is urged to consult its own tax advisor regarding the specific tax consequences of owning and disposing of its ADSs.

Because this summary is not exhaustive of all possible tax considerations - such as situations involving financial institutions, banks, tax exempt entities, pension funds, U.S. expatriates, real estate investment trusts, persons that are dealers in securities, persons who own (directly, indirectly or by attribution) 10% or more of the share capital or voting stock of Nokia, persons who acquired their ADSs pursuant to the exercise of employee stock options or otherwise as compensation, or U.S. Holders whose functional currency is not the U.S. dollar, who may be subject to special rules that are not discussed herein - holders of shares or ADSs that are U.S. Holders are advised to satisfy themselves as to the overall U.S. federal, state and local tax consequences, as well as to the overall Finnish and other applicable non U.S. tax consequences, of their ownership of ADSs and the underlying shares by consulting their own

tax advisors. This summary does not discuss the treatment of ADSs that are held in connection with a permanent establishment or fixed base in Finland, and it does not address the U.S. Medicare tax on certain investment income.

For the purposes of both the Treaty and the U.S. Internal Revenue Code of 1986, as amended, referred to as the “Code”, U.S. Holders of ADSs will be treated as the owners of the underlying shares that are represented by those ADSs. Accordingly, the following discussion, except where otherwise expressly noted, applies equally to U.S. Holders of ADSs, on the one hand, and of shares on the other.

The holders of ADSs will, for Finnish tax purposes, be treated as the owners of the shares that are represented by the ADSs. The Finnish tax consequences to the holders of shares, as discussed below, also apply to the holders of ADSs.

U.S. and Finnish taxation of cash dividends

For U.S. federal income tax purposes, the gross amount of dividends paid to U.S. Holders of shares or ADSs, including any related Finnish withholding tax, generally will be included in gross income as foreign source dividend income. We do not expect to maintain calculations of our earnings and profits under U.S. federal income tax principles; therefore, U.S. Holders should expect that the entire amount of any distribution generally will be reported as dividend income. Dividends will not be eligible for the dividends received deduction allowed to corporations under the Code. The amount includible in income (including any Finnish withholding tax) will equal the U.S. dollar value of the payment, determined at the time such payment is received by the Depositary (in the case of ADSs) or by the U.S. Holder (in the case of shares), regardless of whether the payment is in fact converted into U.S. dollars. Generally, any gain or loss resulting from currency exchange rate fluctuations during the period between the time such payment is received and the date the dividend payment is converted into U.S. dollars will be treated as U.S. source ordinary income or loss to a U.S. Holder.

Special rules govern and specific elections are available to accrual method taxpayers to determine the U.S. dollar amount includible in income in the case of a dividend paid (and taxes withheld) in foreign currency. Accrual basis taxpayers are urged to consult their own tax advisers regarding the requirements and elections applicable in this regard.

Under the Finnish Income Tax Act and Act on Taxation of Non residents’ Income, non residents of Finland are generally subject to a withholding tax at a rate of 30% payable on dividends paid by a Finnish resident company. However, pursuant to the Treaty, dividends paid to U.S. Holders generally will be subject to Finnish withholding tax at a reduced rate of 15% of the gross amount of the dividend.

Qualifying pension funds are, however, pursuant to the Treaty exempt from Finnish withholding tax. Refer also to “—Finnish withholding taxes on nominee registered shares” below.

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Subject to conditions and limitations, Finnish income taxes withheld will be treated as foreign taxes eligible for credit against a U.S. Holder's U.S. federal income tax liability. Dividends received generally will constitute foreign source "passive category income" for foreign tax credit purposes. In lieu of a credit, a U.S. Holder may elect to deduct all of its foreign taxes provided the deduction is claimed for all of the foreign taxes paid by the U.S. Holder in a particular year. A deduction does not reduce U.S. tax on a dollar for dollar basis like a tax credit. The deduction, however, is not subject to the limitations applicable to foreign tax credits.

Provided that certain holding period and other requirements are met, certain U.S. Holders (including individuals and some trusts and estates) are eligible for reduced rates of U.S. federal income tax at a maximum rate of 20% in respect of "qualified dividend income". Dividends that Nokia pays with respect to its shares and ADSs generally will be qualified dividend income if certain holding periods are met and Nokia was neither a passive foreign investment company (PFIC) in the year prior to the year in which the dividend was paid nor in the year in which the dividend is paid. Nokia currently believes that dividends paid with respect to its shares and ADSs will constitute qualified dividend income for U.S. federal income tax purposes; however, this is a factual matter and is subject to change. Nokia anticipates that its dividends will be reported as qualified dividends on Forms 1099 DIV delivered to U.S. Holders. U.S. Holders of shares or ADSs are urged to consult their own tax advisors regarding the availability to them of the reduced dividend tax rate in light of their own particular situation and the computations of their foreign tax credit limitation with respect to any qualified dividends paid to them, as applicable.

We believe we should not be classified as a PFIC for U.S. federal income tax purposes for the taxable year ended December 31, 2018 and we do not expect to become a PFIC in the foreseeable future. U.S. Holders are advised, however, that this conclusion is a factual determination that must be made annually and thus may be subject to change. If we were to be classified as a PFIC, the tax on distributions on our shares or ADSs and on any gains realized upon the disposition of our shares or ADSs generally would be less favorable than as described herein. Dividends paid by a PFIC are not "qualified dividend income" and are not eligible for reduced rates of taxation. Additionally, U.S. persons that are shareholders in a PFIC generally will be required to file an annual report disclosing the ownership of such shares and certain other information. U.S. Holders should consult their own tax advisors regarding the application of the PFIC rules, including the related reporting requirements, to their ownership of our shares or ADSs.

Finnish withholding taxes on nominee registered shares

Generally, for U.S. Holders, the reduced 15% withholding tax rate of the Treaty (instead of 30%) is applicable to dividends paid to nominee registered shares only when the conditions of the provisions applied to dividends are met (Section 10b of the Finnish Act on Taxation of Non residents' Income).

According to the provisions, the Finnish account operator and a foreign custodian are required to have a custody agreement, according to which the custodian undertakes to (a) declare the country of residence of the beneficial owner of the dividend, (b) confirm the applicability of the Treaty to the dividend, (c) inform the account operator of any changes to the country of residence or the applicability of the Treaty, and (d) provide the legal identification and address of the beneficial owner of the dividend and a certificate of residence issued by the local tax authorities upon request. It is further required that the foreign custodian is domiciled in a country with which Finland has entered into a treaty for the avoidance of double taxation and that the custodian is entered into the register of foreign custodians maintained by the Finnish tax authorities.

In general, if based on an applicable treaty for the avoidance of double taxation the withholding tax rate for dividends is 15% or higher, the treaty rate may be applied when the aforementioned conditions of the provisions are met (Section 10b of the Finnish Act on Taxation of Non residents' Income). A lower rate than 15% may be applied based on the applicable treaty for the avoidance of double taxation only when the following information on the beneficial owner of the dividend is provided to the payer prior to the dividend payment: name, date of birth or business ID (if

applicable) and address in the country of residence.

U.S. and Finnish tax on sale or other disposition

A U.S. Holder generally will recognize taxable capital gain or loss on the sale or other disposition of ADSs in an amount equal to the difference between the U.S. dollar value of the amount realized and the adjusted tax basis (determined in U.S. dollars) in the ADSs. If the ADSs are held as a capital asset, this gain or loss generally will be long term capital gain or loss if, at the time of the sale, the ADSs have been held for more than one year. Any capital gain or loss, for foreign tax credit purposes, generally will constitute U.S. source gain or loss. In the case of a U.S. Holder that is an individual, long term capital gain generally is subject to U.S. federal income tax at preferential rates. The deductibility of capital losses is subject to significant limitations.

The deposit or withdrawal by a U.S. Holder of shares in exchange for ADSs or of ADSs for shares under the deposit agreement generally will not be subject to U.S. federal income tax or Finnish income tax.

The sale by a U.S. Holder of the ADSs or the underlying shares, other than an individual who, by reason of his residence in Finland for a period exceeding six months, is or becomes liable for Finnish income tax according to the relevant provisions of Finnish tax law, generally will not be subject to income tax in Finland, in accordance with Finnish tax law and the Treaty.

Finnish transfer tax

Transfers of shares and ADSs could be subject to the Finnish transfer tax only when one of the parties to the transfer is subject to Finnish taxation under the Finnish Income Tax Act by virtue of being a resident of Finland or a Finnish branch of a non-Finnish (a) credit institution (b) investment firm (c) management company of collective investment undertaking or (d) alternative investment fund manager. In accordance with the amendments in the Finnish Transfer Tax Act (applicable from November 9, 2007) no transfer tax is payable on the transfer of publicly traded shares or ADSs (irrespective of whether the transfer is carried out on a stock exchange or not). However, there are certain conditions for the exemption. Prior to the said amendments, transfer tax was not payable on stock exchange transfers. In cases where the transfer tax would be payable, the transfer tax would be 1.6% of the transfer value of the security traded.

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Finnish inheritance and gift taxes

A transfer of an underlying share by gift or by reason of the death of a U.S. Holder and the transfer of an ADS are not subject to Finnish gift or inheritance tax provided that none of the deceased person, the donor, the beneficiary of the deceased person or the recipient of the gift is resident in Finland.

Non-residents of the United States

Beneficial owners of ADSs that are not U.S. Holders will not be subject to U.S. federal income tax on dividends received with respect to ADSs unless such dividend income is effectively connected with the conduct of a trade or business within the United States. Similarly, non U.S. Holders generally will not be subject to U.S. federal income tax on any gain realized on the sale or other disposition of ADSs, unless (a) the gain is effectively connected with the conduct of a trade or business in the United States or (b) in the case of an individual, that individual is present in the United States for 183 days or more in the taxable year of the disposition and other conditions are met.

The United States information reporting and backup withholding

Dividend payments with respect to shares or ADSs and proceeds from the sale or other disposition of shares or ADSs may be subject to information reporting to the Internal Revenue Service and possible U.S. backup withholding. Backup withholding will not apply to a holder if the holder furnishes a correct taxpayer identification number or certificate of foreign status and makes any other required certification in connection therewith, or if it is a recipient otherwise exempt from backup withholding (such as a corporation). Any U.S. person required to establish their exempt status generally must furnish a duly completed IRS Form W-9 (Request for Taxpayer Identification Number and Certification). Non U.S. holders generally are not subject to U.S. information reporting or backup withholding. However, such holders may be required to provide certification of non U.S. status (generally on IRS Form W-8BEN for individuals and Form W-8BEN-E for corporations) in connection with payments received in the United States or through certain U.S. related financial intermediaries. Backup withholding is not an additional tax. Amounts withheld as backup withholding may be credited against a holder's U.S. federal income tax liability, and the holder may obtain a refund of any excess amounts withheld under the backup withholding rules by timely filing the appropriate claim for refund with the Internal Revenue Service and furnishing the proper required information.

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Consolidated income statement

For the year ended December 31	Notes	2018 EURm	2017 EURm	2016 EURm
Net sales	5, 8	22 563	23 147	23 641
Cost of sales	9	(14 117)	(14 008)	(15 117)
Gross profit		8 446	9 139	8 524
Research and development expenses	9	(4 620)	(4 916)	(4 997)
Selling, general and administrative expenses	9	(3 463)	(3 615)	(3 767)
Other income	11	290	363	117
Other expenses	9, 11	(712)	(955)	(977)
Operating (loss)/profit		(59)	16	(1 100)
Share of results of associated companies and joint ventures	34	12	11	18
Financial income and expenses	12	(313)	(537)	(287)
Loss before tax		(360)	(510)	(1 369)
Income tax (expense)/benefit	13	(189)	(927)	457
Loss for the year from Continuing operations		(549)	(1 437)	(912)
Loss for the year from Continuing operations attributable to:				
Equity holders of the parent		(554)	(1 473)	(751)
Non-controlling interests		5	36	(161)
Loss for the year from Continuing operations		(549)	(1 437)	(912)
Profit/(loss) for the year from Discontinued operations attributable to:				
Equity holders of the parent		214	(21)	(15)
Non-controlling interests		–	–	–
Profit/(loss) for the year from Discontinued operations	7	214	(21)	(15)
Loss for the year attributable to:				
Equity holders of the parent		(340)	(1 494)	(766)
Non-controlling interests		5	36	(161)
Loss for the year		(335)	(1 458)	(927)
Earnings per share attributable to equity holders of the parent	14	EUR	EUR	EUR
Basic earnings per share				
Continuing operations		(0.10)	(0.26)	(0.13)
Discontinued operations		0.04	0.00	0.00
Loss for the year		(0.06)	(0.26)	(0.13)
Diluted earnings per share				
Continuing operations		(0.10)	(0.26)	(0.13)
Discontinued operations		0.04	0.00	0.00
Loss for the year		(0.06)	(0.26)	(0.13)
Average number of shares	14	000s shares	000s shares	

			000s shares
Basic			
Continuing operations	5 588 020	5 651 814	5 732 371
Discontinued operations	5 588 020	5 651 814	5 732 371
Loss for the year	5 588 020	5 651 814	5 732 371
Diluted			
Continuing operations	5 588 020	5 651 814	5 741 117
Discontinued operations	5 612 477	5 651 814	5 741 117
Loss for the year	5 588 020	5 651 814	5 741 117

The notes are an integral part of these consolidated financial statements.

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Consolidated statement of comprehensive income

	Notes	2018 EURm	2017 EURm	2016 EURm
For the year ended December 31				
Loss for the year		(335)	(1 458)	(927)
Other comprehensive income				
Items that will not be reclassified to profit or loss:				
Remeasurements of defined benefit plans		388	723	613
Income tax related to items that will not be reclassified to profit or loss		(90)	(58)	(269)
Items that may be reclassified subsequently to profit or loss:				
Translation differences		401	(1 819)	251
Net investment hedges		(73)	440	(103)
Cash flow and other hedges		(53)	35	14
Financial assets at fair value through other comprehensive income		(45)	–	–
Available-for-sale investments		–	(88)	(75)
Other increase/(decrease), net		1	(1)	(6)
Income tax related to items that may be reclassified subsequently to profit or loss		33	(92)	20
Other comprehensive income/(loss), net of tax	22	562	(860)	445
Total comprehensive income/(loss) for the year		227	(2 318)	(482)
Attributable to:				
Equity holders of the parent		221	(2 304)	(277)
Non-controlling interests		6	(14)	(205)
Total comprehensive income/(loss) for the year		227	(2 318)	(482)
Attributable to equity holders of the parent:				
Continuing operations		7	(2 283)	(262)
Discontinued operations		214	(21)	(15)
Total attributable to equity holders of the parent		221	(2 304)	(277)
Attributable to non-controlling interests:				
Continuing operations		6	(14)	(205)
Discontinued operations		–	–	–
Total attributable to non-controlling interests		6	(14)	(205)

The notes are an integral part of these consolidated financial statements.

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Consolidated statement of financial position

As of December 31	Notes	2018 EURm	2017 EURm
ASSETS			
Non-current assets			
Intangible assets	15, 17	8 805	9 219
Property, plant and equipment	16, 17	1 790	1 853
Investments in associated companies and joint ventures	34	145	128
Non-current financial investments(1)	24	690	816
Deferred tax assets	13	4 911	4 582
Other non-current financial assets	24, 36	373	215
Defined benefit pension assets	27	4 224	3 979
Other non-current assets	19	308	368
Total non-current assets		21 246	21 160
Current assets			
Inventories	18	3 168	2 646
Trade receivables	24, 36	4 856	6 880
Contract assets	8, 36	1 875	–
Prepaid expenses and accrued income	19	1 024	1 259
Current income tax assets		227	474
Other financial assets	24, 25, 36	243	302
Current financial investments(1)	24, 36	612	911
Cash and cash equivalents	24, 36	6 261	7 369
Total current assets		18 266	19 841
Assets held for sale		5	23
Total assets		39 517	41 024
SHAREHOLDERS' EQUITY AND LIABILITIES			
Capital and reserves attributable to equity holders of the parent			
Share capital	20	246	246
Share issue premium		436	447
Treasury shares		(408)	(1 480)
Translation differences	21	(592)	(932)
Fair value and other reserves	21	1 063	1 094
Reserve for invested unrestricted equity		15 606	15 616
(Accumulated deficit)/retained earnings		(1 062)	1 147
Total capital and reserves attributable to equity holders of the parent		15 289	16 138
Non-controlling interests		82	80
Total equity		15 371	16 218
Non-current liabilities			
Long-term interest-bearing liabilities	23, 24, 36	2 828	3 457
Deferred tax liabilities	13	350	413
Defined benefit pension and post-retirement liabilities	27	4 327	4 440
Contract liabilities	8	1 113	–

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Deferred revenue and other long-term liabilities	24, 28	852	2 986
Provisions	29	572	766
Total non-current liabilities		10 042	12 062
Current liabilities			
Short-term interest-bearing liabilities	23, 24, 36	994	309
Other financial liabilities	24, 25, 36	891	268
Current income tax liabilities		268	383
Trade payables	24, 36	4 773	3 996
Contract liabilities	8	2 383	–
Accrued expenses, deferred revenue and other liabilities	28	3 940	6 666
Provisions	29	855	1 122
Total current liabilities		14 104	12 744
Total liabilities		24 146	24 806
Total shareholders' equity and liabilities		39 517	41 024

(1) Related to the adoption of IFRS 9, Financial Instruments on January 1, 2018, financial instruments previously presented within “Available for sale investments” are now presented within “Non-current financial investments”, and financial instruments previously presented within “Available for sale investments, liquid assets” and “Investments at fair value through profit and loss, liquid assets” are now presented within “Current financial investments”. Despite the changes in the presentation of comparatives, IFRS 9 has not been adopted retrospectively.

The notes are an integral part of these consolidated financial statements.

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Consolidated statement of cash flows

	Notes	2018 EURm	2017(2) EURm	2016(2) EURm
For the year ended December 31				
Cash flow from operating activities				
Loss for the year		(335)	(1 458)	(927)
Adjustments, total	31	2 093	3 676	2 387
Change in net working capital(1)				
Decrease/(increase) in receivables		246	(421)	18
(Increase)/decrease in inventories		(544)	(296)	533
(Decrease)/increase in non-interest bearing liabilities		(645)	1 221	(2 738)
Cash from/(used in) operations		815	2 722	(727)
Interest received		68	53	85
Interest paid		(159)	(409)	(309)
Income taxes paid, net		(364)	(555)	(503)
Net cash from/(used in) operating activities		360	1 811	(1 454)
Cash flow from investing activities				
Purchase of property, plant and equipment and intangible assets		(672)	(601)	(477)
Proceeds from sale of property, plant and equipment and intangible assets		88	67	28
Acquisition of businesses, net of acquired cash		(31)	(394)	5 819
Proceeds from disposal of businesses, net of disposed cash		(18)	(16)	6
Purchase of current financial investments(3)		(2 104)	(2 729)	(4 131)
Proceeds from maturities and sale of current financial investments(3)		2 397	3 589	5 489
Purchase of non-current financial investments		(145)	(104)	(73)
Proceeds from sale of non-current financial investments		170	207	134
Other		–	(9)	41
Net cash (used in)/from investing activities		(315)	10	6 836
Cash flow from financing activities				
Proceeds from stock option exercises		1	1	6
Purchase of treasury shares		–	(785)	(216)
Purchase of equity instruments of subsidiaries(3)		1	(38)	(724)
Proceeds from long-term borrowings		139	2 129	225
Repayment of long-term borrowings(3)		(31)	(2 044)	(2 599)
Proceeds from/(repayment) of short-term borrowings		2	(42)	(100)
Dividends paid		(1 081)	(970)	(1 515)
Net cash used in financing activities		(969)	(1 749)	(4 923)
Translation differences		(184)	(200)	43
Net (decrease)/increase in cash and cash equivalents		(1 108)	(128)	502
Cash and cash equivalents as of January 1		7 369	7 497	6 995
Cash and cash equivalents as of December 31		6 261	7 369	7 497

(1) Net working capital includes both short-term and long-term items.

(2) Comparatives for 2017 and 2016 have been recasted to reflect the change in the presentation of operating and investing cash flows in 2018. The change was made to simplify the presentation and did not have an impact on net cash used in operating or net cash used in investing activities.

(3) In 2016, Alcatel Lucent ordinary shares and ADSs and OCEANEs acquired in cash by the Group subsequent to the closing of the reopened exchange offer are presented within cash flow from financing activities as purchase of equity instruments of subsidiaries and repayment of long-term borrowings, respectively. In relation to the Public Buy-Out offer/Squeeze-Out, the Group's pledged cash asset of EUR 724 million to cover the purchase of the remaining Alcatel Lucent securities was recorded within cash flow from investing activities as purchase of current financial investments. The amount of pledged cash released upon acquisition of Alcatel Lucent securities of EUR 724 million was recorded within cash flow from investing activities as proceeds from maturities and sale of current financial investments.

The consolidated statement of cash flows combines cash flows from both the Continuing and the Discontinued operations. Refer to Note 7, Discontinued operations.

The amounts in the consolidated statement of cash flows cannot be directly traced from the consolidated statement of financial position without additional information on the acquisitions and disposals of subsidiaries and the net foreign exchange differences arising on consolidation.

The notes are an integral part of these consolidated financial statements.

5 593 162	246	436	(408)	(592)	1 063	15 606	(1 062)	15 289
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(1) Planned maximum annual distribution for 2018 is EUR 0.20 per share to be paid quarterly subject to shareholders' and the Board of Directors' approval (dividend EUR 0.19 per share for 2017 and dividend EUR 0.17 per share for 2016).

The notes are an integral part of these consolidated financial statements.

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1. Corporate information

Nokia Corporation, a public limited liability company incorporated and domiciled in Helsinki, Finland, is the parent company (Parent Company or Parent) for all its subsidiaries (Nokia or the Group). The Group's operational headquarters are located in Espoo, Finland. The Group is listed on the Nasdaq Helsinki Stock Exchange, the New York Stock Exchange and the Euronext Paris Stock Exchange. The Group is a leading global provider of mobile and fixed network infrastructure combining hardware, software and services, as well as advanced technologies and licensing that connect people and things.

On March 21, 2019 the Board of Directors authorized the financial statements for 2018 for issuance and filing.

2. Significant accounting policies

Basis of presentation and statement of compliance

The consolidated financial statements are prepared in accordance with International Financial Reporting Standards as issued by the International Accounting Standards Board (IASB) and as adopted by the European Union (IFRS). The consolidated financial statements are presented in millions of euros (EURm), except as otherwise noted, and are prepared under the historical cost convention, except as disclosed in the accounting policies below. The notes to the consolidated financial statements also conform to the Finnish accounting legislation.

In 2018, the presentation of certain comparative items in the consolidated statement of financial position and consolidated statement of cash flows have been modified to conform with current year presentation. The changes related to the adoption of IFRS 9, Financial Instruments, and the simplification of presentation of cash flows.

Other information

This paragraph is included in connection with statutory reporting requirements in Germany. The fully consolidated German subsidiary, Nokia Solutions and Networks GmbH & Co. KG, registered in the commercial register of Munich under HRA 88537, has made use of the exemption available under § 264b and § 291 of the German Commercial Code (HGB).

Principles of consolidation

The consolidated financial statements comprise the financial statements of the Parent Company, and each of those companies over which it exercises control. Control over an entity exists when the Group is exposed, or has rights, to variable returns from its involvement with the entity and has the ability to affect those returns through its power over the entity. When the Group has less than a majority of voting or similar rights in an entity, the Group considers all relevant facts and circumstances in assessing whether it has power over an entity, including the contractual arrangements, and voting rights and potential voting rights. The Group reassesses whether or not it controls an entity if facts and circumstances indicate that there are changes to the elements of control.

Consolidation of a subsidiary begins when the Group obtains control over the subsidiary and ceases when the Group loses control over the subsidiary. Assets, liabilities, income and expenses of a subsidiary acquired or disposed of during the year are included in the consolidated financial statements from the date the Group gains control until the date the Group ceases to control the subsidiary. A change in the ownership interest of a subsidiary, without a loss of control, is accounted for as an equity transaction. If the Group loses control in a subsidiary, the related assets,

liabilities, non-controlling interest and other components of equity are derecognized with any gain or loss recognized in the consolidated income statement. Any investment retained in the former subsidiary is measured at fair value.

All intercompany transactions are eliminated as part of the consolidation process. Non-controlling interests are presented separately as a component of net profit or loss and are shown as a component of shareholders' equity in the consolidated statement of financial position.

Business combinations

Business combinations are accounted for using the acquisition method. The consideration transferred in a business combination is measured as the aggregate of the fair values of the assets transferred, liabilities incurred towards the former owners of the acquired entity or business and equity instruments issued. Acquisition-related costs are recognized as expenses in the consolidated income statement in the period in which the costs are incurred and the related services are received with the exception of costs directly attributable to the issuance of equity instruments that are accounted for as a deduction from equity.

Identifiable assets acquired and liabilities assumed are measured at the acquisition date fair values. The Group elects whether to measure the non-controlling interests in the acquiree at fair value or at the proportionate share of the acquiree's identifiable net assets on a business combination by business combination basis. The excess of the aggregate of the consideration transferred and the amount recognized for non-controlling interests over the acquisition date fair values of the identifiable net assets acquired is recorded as goodwill.

Investment in associates and joint ventures

An associate is an entity over which the Group exercises significant influence. Significant influence is the power to participate in the financial and operating policy decisions of the entity, but is not control or joint control over those policies.

A joint venture is a type of joint arrangement whereby the parties that have joint control of the arrangement have rights to the net assets of the arrangement. Joint control is the contractually agreed sharing of control of an arrangement, which exists only when decisions about relevant activities require the unanimous consent of the parties sharing control.

The Group's investments in associates and joint ventures are accounted for using the equity method. Under the equity method, the investment in an associate or joint venture is initially recognized at cost. The carrying amount of the investment is adjusted to recognize changes in the Group's share of net assets of the associate or joint venture since the acquisition date. The Group's share of profits and losses of associates and joint ventures is included in the consolidated income statement outside operating profit or loss. Any change in other comprehensive income (OCI) of associates and joint ventures is presented as part of the Group's OCI.

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After application of the equity method, as of each reporting date, the Group determines whether there is objective evidence that the investment in an associate or joint venture is impaired. If there is such evidence, the Group recognizes an impairment loss that is calculated as the difference between the recoverable amount of the associate or joint venture and its carrying value. The impairment loss is presented in 'Share of results of associated companies and joint ventures' in the consolidated income statement.

Non-current assets held for sale (or disposal groups) and discontinued operations

Non-current assets or disposal groups are classified as assets held for sale if their carrying amounts will be recovered principally through a sale transaction rather than through continuing use. For this to be the case, the asset, or the disposal group, must be available for immediate sale in its present condition subject only to terms that are usual and customary for sales of such assets or disposal groups, and the sale must be highly probable. These assets, or in the case of disposal groups, assets and liabilities, are presented separately in the consolidated statement of financial position and measured at the lower of the carrying amount and fair value less costs to sell. Non-current assets classified as held for sale, or included in a disposal group classified as held for sale, are not depreciated or amortized.

Discontinued operations are reported when a component of the Group, comprising operations and cash flows that can be clearly distinguished both operationally and for financial reporting purposes from the rest of the Group, is classified as held for sale or has been disposed of, or the component represents a major line of business or geographical area of operations, or is a part of a single coordinated plan to dispose of a separate major line of business or geographical area of operations. Profit or loss from Discontinued operations is reported separately from income and expenses from Continuing operations in the consolidated income statement, with prior periods presented on a comparative basis. Cash flows for Discontinued operations are presented separately in the notes to the consolidated financial statements. Intra-group revenues and expenses between Continuing and Discontinued operations are eliminated.

Revenue recognition

On January 1, 2018, the Group adopted IFRS 15, Revenue from Contracts with Customers. IFRS 15 establishes a five-step model that applies to revenue arising from contracts with customers. Under IFRS 15, revenue is recognized to reflect the transfer of promised goods and services to customers for amounts that reflect the consideration to which the Group expects to be entitled in exchange for those goods and services.

The Group accounts for a contract with a customer when the contract has been approved in writing and both parties are committed to perform their respective obligations, the rights, including payment terms, regarding the goods and services to be transferred can be identified, the contract has commercial substance, and collection of the consideration to which the Group expects to be entitled is probable. In accordance with IFRS 15, management considers only legally enforceable rights in evaluating the accounting for contracts with customers. As such, frame agreements that do not create legally enforceable rights and obligations are accounted for based on the issuance of subsequent legally binding purchase orders under the frame agreements.

Since a significant part of the Group's business is conducted under framework agreements with no fixed commitment on the overall project scope, consideration on whether the subsequent purchase orders should be treated as separate contracts or modifications to the existing contract is deemed as a critical judgment impacting both timing and allocation of revenue. A contract modification or a purchase order is accounted for as a separate contract if the scope of the contract increases by additional distinct goods or services, and the price of the contract increases by an amount that reflects the standalone selling price of those additional goods or services. In case the additional goods or services are distinct but not sold at a standalone selling price, the contract modification is accounted for prospectively. In cases where the additional goods or services are not distinct, the modification is accounted for through a cumulative

catch-up adjustment.

The Group recognizes revenue from contracts with customers to reflect the transfer of promised goods and services to customers for amounts that reflect the consideration to which the Group expects to be entitled in exchange for those goods and services. The consideration may include a variable amount which the Group estimates using the most likely amount method. Items causing variability include for example volume discounts and sales-based or usage-based royalties. The Group includes variable consideration into the transaction price only to the extent that it is highly probable that a significant revenue reversal will not occur. The transaction price also excludes amounts collected on behalf of third parties.

The Group's payment terms are on average 90 to 180 days. Invoices are generally issued as control transfers and/or as services are rendered. When this is not the case the Group recognizes a contract asset or liability depending on the timing of payment versus transfer of control. In case the timing of payments provides either the customer or the Group with a significant benefit of financing, the transaction price is adjusted for the effect of financing and the related interest revenue or interest expense is presented separately from revenue. As a practical expedient, the Group does not account for financing components if the consideration is received in one year or less before or after the goods or services have been transferred to the customer.

The Group enters into contracts with customers consisting of any combination of hardware, services and intellectual property. The associated revenue recognized for such contracts depends on the nature of the underlying goods and services provided. The Group identifies all the promised goods and services in a customer contract at contract inception to determine which represent distinct goods and services. The promises in the contract might include for example sale of goods, granting licenses, and granting options to purchase additional goods or services that may provide the customer with a material right. The Group considers there to be a distinct performance obligation if the customer can benefit from the good or service either on its own or together with other resources readily available, and if the Group's promise to transfer the good or service is separately identifiable from other promises in the contract.

The Group allocates the transaction price to each distinct performance obligation on the basis of their stand-alone selling prices, relative to the overall transaction price. If a stand-alone selling price is not observable, it is estimated. The transaction price may include a discount or a variable amount of consideration that relates entirely to a part of the contract. Except when the Group has observable evidence that the entire discount relates to only one or more, but not all, performance obligations in a contract, the Group allocates the discount proportionately to all performance obligations in the contract.

Revenue is recognized when, or as, the Group satisfies a performance obligation by transferring a promised good or service to a customer which is when the customer obtains control of that good or service. The amount of revenue recognized is the amount allocated to the satisfied performance obligation based on the relative standalone selling prices. A performance obligation may be satisfied at a point in time or over time.

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Sale of products

The Group manufactures and sells a range of networking equipment, covering the end-to-end requirements of network operators. Revenue for these products is recognized when control of the products has transferred, the determination of which may require judgment. Typically, for standard equipment sales, control transfers upon delivery. For more complex solutions, control generally transfers upon acceptance.

In some arrangements, mainly within the submarine cable business, the Group provides its customer with products in a way that meets the over time revenue recognition criteria, as the Group's performance does not create an asset with an alternative use, and the Group has enforceable rights to payment for the work completed to date. In these arrangements, progress is measured by using the output method, as that is a faithful depiction of how the customer obtains control of the performance by the Group. The output measure selected by the Group may vary from each contract depending on the nature of contract.

Sale of services

The Group provides services related to the provision of networking equipment, ranging from managing a customer's network and product maintenance services to network installation, integration and optimization. Revenue for each separate service performance obligation is recognized as or when the customer obtains the benefits of the Group's performance. Service revenue is recognized over time for managed and maintenance services, as in these cases the Group performs throughout a fixed contract term and the customer simultaneously receives and consumes the benefits as the Group performs. In some cases, services provided by the Group must be accepted by the Customer after such services are performed. In these cases, revenue is generally recognized when the Group receives the customer acceptance.

Sale of intellectual property licenses

The Group provides its customers with licenses to intellectual property (IP) owned by the Group both by granting licenses of software developed by the Group and by granting customers with rights to benefit from the Group's IP in their products. When a software license is sold, revenue is recognized upon delivery or acceptance of the software, as the Group has determined its software meets the right-to-use criteria established under IFRS 15.

When the Group grants customers a license to use IP owned by the Group, the associated license fee revenue is recognized in accordance with the substance of the relevant agreements. In the majority of cases, the Group retains obligations to continue to develop and make available to the customer the latest IP in the licensed assets during the contract term, and therefore revenue is recognized pro rata over the period during which the Group is expected to perform. Recognition of the revenue as pro rata over the term of the license is considered the most faithful depiction of the Group's satisfaction of the performance obligation as the IP being licensed towards the customer includes new inventions patented by the Group that are highly interdependent and interrelated and created through the course of its continuous R&D efforts. Such R&D efforts are relatively stable throughout the year. In some contracts, the Group has no remaining obligations to perform after granting a license to the initial IP, and licensing fees are non-refundable. In these cases, revenue is recognized at the beginning of the license term.

One License Agreement continues to be accounted for under IAS 18 Revenue as it was determined to be a completed contract as defined in the transition guidance of the IFRS 15 standard, refer to Note 8, Revenue recognition.

Refer to Note 4, Use of estimates and critical accounting judgments, related to the determination of revenue to be recognized each period.

Government grants

Government grants are recognized when there is reasonable assurance that the Group will comply with the conditions attached to them and the grants will be received. Government grants received as compensation for expenses or losses incurred are recognized in the consolidated income statement as a deduction against the related expenses. Government grants related to assets are presented in the consolidated statement of financial position as deferred income and recognized as income over the same period the asset is depreciated or amortized.

Government grants received in the form of R&D tax credits are recognized as a deduction against R&D expenses if the amount of the tax credit is linked to the amount of R&D expenditures incurred by the Group and the tax credit is a fully collectible asset which will be paid in cash by the government in case the Group is not able to offset it against its income tax payable. R&D tax credits that do not meet both conditions are recognized as income tax benefit.

Employee benefits

Pensions and other post-employment benefits

The Group companies have various post-employment plans in accordance with the local conditions and practices in the countries in which they operate. The plans are generally funded through payments to insurance companies or contributions to trustee-administered funds as determined by periodic actuarial calculations.

In a defined contribution plan, the Group's legal or constructive obligation is limited to the amount that it agrees to contribute to the fund. The Group's contributions to defined contribution plans, multi-employer and insured plans are recognized in the consolidated income statement in the period to which the contributions relate. If a pension plan is funded through an insurance contract where the Group does not retain any legal or constructive obligations, the plan is treated as a defined contribution plan. All arrangements that do not fulfill these conditions are considered defined benefit plans.

For defined benefit plans, including pension and post-retirement healthcare and life insurance, costs are assessed using the projected unit credit method: the cost is recognized in the consolidated income statement so as to spread the benefit over the service lives of employees. The defined benefit obligation is measured as the present value of the estimated future cash outflows using interest rates on high-quality corporate bonds or government bonds with maturities that most closely match expected payouts of benefits. The liability or asset recognized in the consolidated statement of financial position is the present value of the defined benefit obligation as of the reporting date less the fair value of plan assets including effects of any asset ceiling.

Service cost related to employees' service in the current period is presented within cost of sales, research and development expenses or selling, general and administrative expenses and net interest is presented within financial income and expenses in the consolidated income statement. Past service costs or gains arising from plan amendments and curtailments, as well as gains and losses on settlements, are recognized immediately in the consolidated income statement as part of other operating income or expense when the plan amendment, curtailment or

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settlement occurs. Remeasurements in the defined benefit liability and asset comprise actuarial gains and losses arising from experience adjustments, changes in actuarial assumptions, changes in the effect of the asset ceiling and the return on plan assets, excluding amounts recognized in net interest. Remeasurements are recognized immediately in the consolidated statement of financial position with a corresponding debit or credit to fair value and other reserves in shareholders' equity through other comprehensive income in the period in which they occur and are not reclassified to the consolidated income statement in subsequent periods.

Actuarial valuations for the Group's defined benefit post-employment plans are performed annually or when a material plan amendment, curtailment or settlement occurs.

Termination benefits

Termination benefits are payable when employment is terminated before the normal retirement date, or whenever an employee accepts voluntary redundancy in exchange for these benefits. The Group recognizes termination benefits when it is demonstrably committed to either terminating the employment of current employees according to a detailed formal plan without possibility of withdrawal, or providing termination benefits as a result of an offer made to encourage voluntary redundancy. Local laws may provide employees with the right to benefits from the employer upon termination whether the termination is voluntary or involuntary. For these specific termination benefits, the portion of the benefit that the Group would be required to pay to the employee in the case of voluntary termination is treated as a legal obligation determined by local law and accounted for as a defined benefit arrangement as described in the pensions section above.

Share-based payment

The Group offers three types of global equity-settled share-based compensation plans for employees: performance shares, restricted shares and the employee share purchase plan.

Employee services received and the corresponding increase in equity are measured by reference to the fair value of the equity instruments as of the grant date, excluding the impact of any non-market vesting conditions. Non-market vesting conditions attached to the performance shares are included in assumptions about the number of shares that the employee will ultimately receive. The Group reviews the assumptions made on a regular basis and, where necessary, revises its estimates of the number of performance shares that are expected to be settled. Plans that apply tranching are accounted for under the graded vesting model. Share-based compensation is recognized as an expense in the consolidated income statement over the relevant service periods.

Income taxes

The income tax expense comprises current tax and deferred tax. Tax is recognized in the consolidated income statement except to the extent that it relates to items recognized in other comprehensive income, or directly in equity; then the related tax is recognized in other comprehensive income or equity, respectively.

Current taxes are based on the results of Group companies and are calculated using the local tax laws and tax rates that are enacted or substantively enacted as of each reporting date. Corporate taxes withheld at the source of the income on behalf of Group companies are accounted for in income taxes where determined to represent a tax on net income.

The Group periodically evaluates positions taken in tax returns with respect to situations in which applicable tax regulation is subject to interpretation. It adjusts the amounts recorded, where appropriate, on the basis of amounts expected to be paid to the tax authorities. The amount of current income tax liabilities for uncertain income tax positions is recognized when it is more likely than not that certain tax positions may not be fully sustained upon

review by tax authorities. The amounts recorded are based upon the estimated future settlement amount as of each reporting date.

Deferred tax assets and liabilities are determined using the liability method for all temporary differences arising between the tax bases of assets and liabilities and their carrying amounts in the consolidated financial statements. Deferred tax assets are recognized to the extent it is probable that future taxable profit will be available against which the unused tax losses, unused tax credits and deductible temporary differences can be utilized in the relevant jurisdictions. Deferred tax assets are assessed for realizability as of each reporting date. When circumstances indicate it is no longer probable that deferred tax assets will be utilized, adjustments are made as necessary. Deferred tax liabilities are recognized for temporary differences that arise between the fair value and the tax base of identifiable net assets acquired in business combinations.

Deferred tax assets and deferred tax liabilities are offset for presentation purposes when there is a legally enforceable right to set off current tax assets against current tax liabilities, and the deferred tax assets and deferred tax liabilities relate to income taxes levied by the same taxation authority on either the same taxable entity or different taxable entities which intend either to settle current tax liabilities and assets on a net basis, or to realize the assets and settle the liabilities simultaneously in each future period in which significant amounts of deferred tax liabilities or deferred tax assets are expected to be settled or recovered.

Deferred tax liabilities are not recognized if they arise from the initial recognition of goodwill. Deferred tax liabilities are provided on taxable temporary differences arising from investments in subsidiaries, associates and joint arrangements, except for deferred tax liability where the timing of the reversal of the temporary difference is controlled by the Group, and it is probable that the temporary difference will not reverse in the foreseeable future.

The enacted or substantively enacted tax rates as of each reporting date that are expected to apply in the period when the asset is realized or the liability is settled are used in the measurement of deferred tax assets and deferred tax liabilities. Deferred tax assets and liabilities are not discounted.

Foreign currency translation

Functional and presentation currency

The financial statements of all Group companies are measured using functional currency, which is the currency of the primary economic environment in which the entity operates. The consolidated financial statements are presented in euro, the functional and presentation currency of the Parent Company.

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Transactions in foreign currencies

Transactions in foreign currencies are recorded at exchange rates prevailing as of the dates of the individual transactions. For practical reasons, a rate that approximates the actual rate as of the date of the transaction is often used. Monetary assets and liabilities denominated in foreign currency are valued at the exchange rates prevailing at the end of the reporting period. Foreign exchange gains and losses arising from monetary assets and liabilities as well as fair value changes of related hedging instruments are recognized in financial income and expenses in the consolidated income statement. Unrealized foreign exchange gains and losses related to non-monetary non-current financial investments are included in the fair value measurement of these investments and recognized in other income and expenses in the consolidated income statement.

Foreign Group companies

All income and expenses of foreign Group companies where the functional currency is not the euro are translated into euro at the average foreign exchange rates for the reporting period. All assets and liabilities of foreign Group companies are translated into euro at foreign exchange rates prevailing at the end of the reporting period. Differences resulting from the translation of income and expenses at the average rate and assets and liabilities at the closing rate are recognized as translation differences in consolidated statement of comprehensive income. On the disposal of all or part of a foreign group company through sale, liquidation, repayment of share capital or abandonment, the cumulative amount or proportionate share of translation differences is recognized as income or expense when the gain or loss on disposal is recognized.

Intangible assets

Intangible assets acquired separately are measured on initial recognition at cost. The cost of intangible assets acquired in a business combination is their fair value as of the date of acquisition. Internally generated intangibles, except for development costs that may be capitalized, are expensed as incurred. Development costs are capitalized only if the Group has the technical feasibility to complete the asset; has an ability and intention to use or sell the asset; can demonstrate that the asset will generate future economic benefits; has resources available to complete the asset; and has the ability to measure reliably the expenditure during development.

Following initial recognition, intangible assets are carried at cost less accumulated amortization and accumulated impairment losses. Intangible assets are amortized over their useful lives, generally three to ten years, using the straight-line method which is considered reflecting best the pattern in which the asset's future economic benefits are expected to be consumed. Depending on the nature of the intangible asset, the amortization charges are presented within cost of sales, research and development expenses or selling, general and administrative expenses in the consolidated income statement.

Property, plant and equipment

Property, plant and equipment are stated at cost less accumulated depreciation and accumulated impairment losses. Depreciation is recorded on a straight-line basis over the expected useful lives of the assets as follows:

Buildings and constructions	
Buildings and constructions	20–33 years
Light buildings and constructions	3–20 years
Machinery and equipment	
Production machinery, measuring and test equipment	1–5 years

Other machinery and equipment

3–10 years

Land and water areas are not depreciated.

Maintenance, repairs and renewals are generally expensed in the period in which they are incurred. However, major renovations are capitalized and included in the carrying amount of the asset when it is probable that future economic benefits in excess of the originally assessed standard of performance of the existing asset will flow to the Group. Major renovations are depreciated over the remaining useful life of the related asset. Leasehold improvements are depreciated over the shorter of the lease term and the useful life. Gains and losses on the disposal of property, plant and equipment are included in operating profit or loss.

Leases

Leases are classified as finance leases whenever the terms of the lease transfer substantially all the risks and rewards incidental to ownership to the lessee. All other leases are classified as operating leases.

The Group has entered into various operating lease contracts as a lessee. The related payments are treated as rental expenses and recognized in the consolidated income statement on a straight-line basis over the lease terms unless another systematic approach is more representative of the pattern of the benefit.

The Group does not have any significant finance lease arrangements.

Impairment of goodwill, other intangible assets and property, plant and equipment

The Group assesses the recoverability of the carrying value of goodwill, other intangible assets and property, plant and equipment if events or changes in circumstances indicate that the carrying value may be impaired. In addition, the Group tests the carrying value of goodwill for impairment annually even if there is no indication of impairment.

Factors that the Group considers when it reviews indications of impairment include, but are not limited to, underperformance of the asset relative to its historical or projected future results, significant changes in the manner of using the asset or the strategy for the overall business, and significant negative industry or economic trends.

Goodwill is allocated to the cash-generating units or groups of cash-generating units that are expected to benefit from the synergies of the related business combination and that reflect the lowest level at which goodwill is monitored for internal management purposes. A cash-generating unit, as determined for the purposes of the Group's goodwill impairment testing, is the smallest group of assets, including goodwill, generating cash inflows that are largely independent of the cash inflows from other assets or groups of assets. The carrying value of a cash-generating unit includes its share of relevant corporate assets allocated to it on a reasonable and consistent basis. When the composition of one or more groups of cash

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generating units to which goodwill has been allocated is changed, the goodwill is reallocated based on the relative fair value of the affected groups of cash generating units.

The Group conducts its impairment testing by determining the recoverable amount for an asset or a cash-generating unit. The recoverable amount of an asset or a cash-generating unit is the higher of its fair value less costs of disposal and its value-in-use. The recoverable amount is compared to the asset's or cash-generating unit's carrying value. If the recoverable amount for the asset or cash-generating unit is less than its carrying value, the asset is considered impaired and is written down to its recoverable amount. Impairment losses are presented in other expenses, or as a separate line item if significant, in the consolidated income statement.

Inventories

Inventories are stated at the lower of cost and net realizable value. Cost is determined using standard cost, which approximates actual cost on a first-in first-out (FIFO) basis. Net realizable value is the amount that can be realized from the sale of the inventory in the normal course of business after allowing for the costs of realization. In addition to the cost of materials and direct labor, an appropriate proportion of production overhead is included in the inventory values. An allowance is recorded for excess inventory and obsolescence based on the lower of cost and net realizable value.

Fair value measurement

A number of financial instruments are measured at fair value as of each reporting date after initial recognition. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. The fair value of an asset or a liability is measured using the assumptions that market participants would use when pricing the asset or liability, assuming that market participants act in their economic best interest by using quoted market rates, discounted cash flow analyses and other appropriate valuation models. The Group uses valuation techniques that are appropriate in the circumstances and for which sufficient data is available to measure fair value, maximizing the use of relevant observable inputs and minimizing the use of unobservable inputs. All assets and liabilities for which fair values are being measured or disclosed in the consolidated financial statements are categorized within the fair value hierarchy, described as follows, based on the lowest level input that is significant to the fair value measurement as a whole:

Level 1—Quoted (unadjusted) market prices for exchange-traded products in active markets for identical assets or liabilities;

Level 2—Valuation techniques for which significant inputs other than quoted prices are directly or indirectly observable; and

Level 3—Valuation techniques for which significant inputs are unobservable.

The Group categorizes assets and liabilities that are measured at fair value on a recurring basis into an appropriate level of the fair value hierarchy at the end of each reporting period.

Classification and measurement of financial assets

The Group has classified its financial assets in the following three categories: financial assets measured at amortized cost, financial assets measured at fair value through other comprehensive income and financial assets measured at fair value through profit and loss. The selection of the appropriate category is made based on both the Group's business model for managing the financial asset and on the contractual cash flow characteristics of the asset.

The Group's business model for managing financial assets is defined on portfolio level. The business model must be observable on practical level by the way business is managed. The cash flows of financial assets measured at amortized cost are solely payments of principal and interest. These assets are held within a business model which has an objective to hold assets to collect contractual cash flows. Financial assets measured at fair value through other comprehensive income have cash flows that are solely payments of principal and interest and these assets are held within a business model which has an objective that is achieved both by holding financial assets to collect contractual cash flows and selling financial assets. Financial assets measured at fair value through profit and loss are assets that do not fall in either of these two categories. In addition to the classification as described above, the accounting for financial assets is impacted if the financial asset is part of a hedging relationship (see below the section on Hedge accounting).

All purchases and sales of financial assets are recorded on the trade date, that is, when the Group commits to purchase or sell the asset. A financial asset is de-recognized when substantially all the risks and rewards related to the financial asset have been transferred to a third party that assumes control of the financial asset.

Non-current financial investments

Non-current financial investments include investments in unlisted private equity shares, technology-related publicly quoted shares and unlisted venture funds and are classified as fair value through profit and loss. These equity investments are initially recognized and subsequently remeasured at fair value.

Fair value is estimated using a number of methods, including, but not limited to: quoted market rates; the current market value of similar instruments; prices established from a recent arm's-length financing transaction of target companies; and analysis of market prospects and operating performance of target companies, taking into consideration public market comparable companies in similar industry sectors. The Group uses judgment in selecting the appropriate valuation methodology as well as underlying assumptions based on existing market practice and conditions.

Fair value adjustments, foreign exchange gains and losses as well as realized gains and losses from the disposal of these investments are recognized within other income and expenses in the consolidated income statement. Weighted average method is used to determine the cost basis of the investments disposed.

Other non-current financial assets

Other non-current financial assets include restricted assets and other receivables, customer and vendor financing related loan receivables and certain other investments of a long-term nature.

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Restricted assets and other receivables include restricted bank deposits and other loan receivables. These assets are initially measured at fair value and in subsequent periods at amortized cost using the effective interest method. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. For these assets, a loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, recorded as an adjustment to the carrying amount of the investment and recognized in other financial expenses in the consolidated income statement.

Customer and vendor related loan receivables are managed in a portfolio with a business model of holding investments to collect principal and interest as well as selling investments. They are initially recognized and subsequently remeasured at fair value determined using discounted cash flow method. The changes in fair value are recognized in fair value reserve in other comprehensive income. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. Estimated credit loss is typically based on 12 month expected credit loss for existing loans and estimated additional draw-downs during that period, refer to Impairments section for further detail. Loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, derecognized from other comprehensive income and recognized in other financial expenses in the consolidated income statement. In case a receivable is sold, the impact of expected credit loss is reversed, and the full gain or loss incurred for the sale is recorded in financial income and expenses in the consolidated income statement.

The cash flows of other investments of a long-term nature do not fulfil the criteria of being solely payments of principal and interest. These investments are initially recognized and subsequently remeasured at fair value using quoted market rates, discounted cash flow models or other appropriate valuation methods as of the reporting date. Fair value adjustments, foreign exchange gains and losses as well as realized gains and losses from the disposal of these investments are mainly recognized within financial income and expenses in the consolidated income statement.

Other current financial assets

Other current financial assets include current part of other non-current financial assets and short-term loan receivables as well as derivative assets that are discussed separately in Derivative financial instruments section below.

Short-term loan receivables are initially measured at fair value and in subsequent periods measured at amortized cost using the effective interest method. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. For these loans, a loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, recorded as an adjustment to the carrying amount of the investment and recognized in other financial expenses in the consolidated income statement.

Trade receivables

Trade receivables arise from contracts with customers and represent an unconditional right to receive the consideration and only the passage of time is required before the consideration is received. The business model for managing trade receivables is holding receivables to collect contractual cash flows and selling receivables. Trade receivables are initially recognized and subsequently remeasured at fair value, determined using discounted cash flow method. The changes in fair value are recognized in fair value reserve in other comprehensive income. Upon adoption of IFRS 9, the Group applies a simplified approach to recognizing a loss allowance on trade receivables based on measurement of lifetime expected credit losses arising from trade receivables without significant financing components. Refer to Note 4, Use of estimates and critical accounting judgments, for disclosure of the use of estimates and critical accounting judgments necessary in the estimation of such loss allowances. Loss allowances on trade receivables are recognized in other operating expenses in the consolidated income statement. If trade receivables

are sold, the difference between the carrying amount derecognized and the consideration received is recognized in financial expenses in the consolidated income statement.

Current financial investments

The Group invests a portion of the corporate cash needed to cover the projected cash outflows of its ongoing business operations in highly liquid, interest-bearing investments. Current financial investments may include investments measured at amortized cost, investments measured at fair value through other comprehensive income and investments measured at fair value through profit and loss.

Corporate cash investments in bank deposits used as collaterals for derivative transactions are initially measured at fair value and in subsequent periods measured at amortized cost using the effective interest method. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement.

Corporate cash investments in bank deposits as well as fixed income and money market securities with initial maturity or put feature longer than three months that have characteristics of solely payments of principal and interest and are not part of a structured investments, are managed in a portfolio with a business model of holding investments to collect principal and interest as well as selling investments, and are classified as fair value through other comprehensive income. In this portfolio investments are executed with the main purpose of collecting contractual cash flows and principal repayments. However, investments are sold from time to time for bucket rebalancing needs as well as liquidity management and market risk mitigation purposes.

The fair value of these investments is determined using quoted market rates, discounted cash flow models or other appropriate valuation methods as of the reporting date. The changes in fair value are recognized in fair value reserve in other comprehensive income. Interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement. When an investment is disposed of, the related accumulated fair value changes are derecognized from other comprehensive income and recognized in financial income and expenses in the consolidated income statement. The FIFO method is used to determine the cost basis of fixed-income securities being disposed of.

Due to the high credit quality of the Group's investment portfolio, the estimated credit loss is normally based on 12 month expected credit loss. Loss allowance is calculated on a quarterly basis, derecognized from other comprehensive income and recognized in other financial expenses in the consolidated income statement.

Corporate cash investments may also include money market funds that do not qualify as cash equivalents, investments acquired for trading purposes, investment structures consisting of securities traded in combination with derivatives with complementing and typically offsetting risk

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factors and other investments that have cash flows not being solely payments of principal and interest. In this portfolio investments are executed with the purpose of collecting contractual cash flows and principal repayments as well as for capital appreciation and can be sold at any time.

These investments are initially recognized and subsequently remeasured at fair value determined using quoted market rates, discounted cash flow models or other appropriate valuation methods as of the reporting date. Fair value adjustments, foreign exchange gains and losses and realized gains and losses are recognized in financial income and expenses in the consolidated income statement.

Cash and cash equivalents

Cash and cash equivalents include cash at bank and in hand as well as highly liquid, fixed-income and money-market investments that are readily convertible to known amounts of cash with maturities at acquisition of three months or less, as well as bank deposits with maturities or contractual call periods at acquisition of three months or less. Due to the high credit quality and short-term nature of these investments, there is an insignificant risk of change in value. Investments in money market funds that have a risk profile consistent with the afore-mentioned criteria are also classified as cash equivalents. Investments that have cash flows that are solely payments of principal and interest are measured at amortized cost. All other investments are measured at fair value through profit and loss.

Classification and measurement of financial liabilities

The Group has classified its financial liabilities in the following categories: financial liabilities measured at amortized cost and financial liabilities measured at fair value through profit and loss. The Group classifies derivative liabilities at fair value through profit and loss and all other financial liabilities at amortized cost.

All financial liabilities are initially recognized at fair value and, in case of borrowings and payables, net of transaction costs. Financial liabilities are derecognized when the related obligation is discharged or cancelled or expired. Additionally, a substantial modification of the terms of an existing financial liability is accounted for as a derecognition of the original financial liability and the recognition of a new financial liability. On derecognition of a financial liability, the difference between the carrying amount extinguished and the consideration paid is recognized in interest expenses in the consolidated income statement.

Interest-bearing liabilities

Long-term interest-bearing liabilities are measured at amortized cost using the effective interest method. Short-term interest-bearing liabilities, including current part of long-term interest-bearing liabilities and collaterals for derivative transactions, are measured at amortized cost using the effective interest method.

Transaction costs, interest calculated using the effective interest method as well as foreign exchange gains and losses are recognized in financial income and expenses in the consolidated income statement.

Other financial liabilities

Other financial liabilities mainly include a conditional obligation to China Huaxin as part of the Nokia Shanghai Bell definitive agreements where China Huaxin obtained the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group in exchange for a future cash settlement. The present value discount on the financial liability is recognized in interest expenses and any changes in the estimated future cash settlement is recognized in financial income and expense in the consolidated income statement.

Other financial liabilities also include derivative liabilities that are discussed separately in Derivative financial instruments section below.

Trade payables

Trade payables are carried at invoiced amount which is considered to be equal to the fair value due to the short-term nature of the Group's trade payables.

Impairments

Impairment requirements apply to the recognition of a loss allowance for expected credit losses (ECL) on financial assets measured at amortized cost, financial assets measured at fair value through other comprehensive income, financial guarantee contracts and loan commitments. The Group continuously assesses its financial instruments on a forward-looking basis and accounts for the changes in ECL on a quarterly basis using the following method:

§ $ECL = PD \times LGD \times EAD$

§ Probability of Default (PD) is estimated separately for the centralized investment portfolio and non-centralized investments. The estimate is based on the credit rating profile of these investments, unless there are specific events that would indicate that the credit rating would not be an appropriate basis for estimating credit risk at the reporting date.

§ For Loss Given Default (LGD) the recovery rate is also estimated separately for centralized investment portfolios and non-centralized investments and is based on the type of investment as well as related collateral arrangements, if any.

§ Exposure at Default (EAD) is normally the nominal value of the investment or financial guarantee. For loan commitments EAD is based on estimated draw-down amounts for the next 12 months.

All the Group's current investments at amortized cost and fair value through other comprehensive income are considered to have low credit risk, and the loss allowance recognized during the period is therefore limited to 12 months expected losses. Financial instruments that are rated as investment grade are considered to have low credit risk for the purposes of this assessment.

For other non-current financial assets, loans, loan commitments and financial guarantees extended to third parties, the ECL is calculated separately for each significant counterparty using the method described above, including the impact of any collateral arrangements or other credit enhancements to LGD. The estimate is based on 12-month ECL unless there has been a significant increase in credit risk for the specific counterparty since the initial recognition, in which case lifetime ECL is estimated. Breaches of contract, credit rating downgrades and other credit measures are typical indicators that the Group takes into consideration when assessing, whether the credit risk on a financial instrument has increased significantly since initial recognition.

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The change in the amount of loss allowance for ECL is recognized as an impairment gain or loss in financial income and expenses in the consolidated income statement. For assets carried at amortized cost the loss allowance is recorded as an adjustment to the carrying amount. For assets carried at fair value through other comprehensive income the loss allowance is recorded as an adjustment in other comprehensive income instead of adjusting the carrying amount that has already been recorded at fair value. For financial guarantee contracts the loss allowance is recognized as an other liability in the statement of financial position.

Impairment losses on contract assets arising from the Group's contracts with customers are recognized as other operating expenses in the consolidated income statement.

Derivative financial instruments

All derivatives are recognized initially at fair value on the date a derivative contract is entered into and subsequently remeasured at fair value. The method of recognizing the resulting gain or loss varies according to whether the derivatives are designated and qualify under hedge accounting.

The cash flows of a hedge are classified as cash flows from operating activities in the consolidated statement of cash flows in case the underlying hedged items relate to the Group's operating activities. When a derivative contract is accounted for as a hedge of an identifiable position relating to financing or investing activities, the cash flows of the contract are classified in the same way as the cash flows of the position being hedged. Certain derivatives are hedging the foreign exchange risk of the Group's cash position and their cash flows are included in foreign exchange adjustment in the consolidated statement of cash flows.

Derivatives not designated in hedge accounting relationships carried at fair value through profit and loss

Foreign exchange forward contracts are valued at market-forward exchange rates. Changes in fair value are measured by comparing these rates with the original contract-forward rate. Currency options are valued as of each reporting date by using the Garman & Kohlhagen option valuation model. Changes in fair value are recognized in the consolidated income statement.

Fair values of forward rate agreements, interest rate options, futures contracts and exchange-traded options are calculated based on quoted market rates as of each reporting date. Discounted cash flow method is used to value interest rate and cross currency swaps. Changes in fair value are recognized in the consolidated income statement.

For derivatives not designated under hedge accounting but hedging identifiable exposures such as anticipated foreign currency denominated sales and purchases, the gains and losses are recognized in other income or expenses in the consolidated income statement. The gains and losses on all other derivatives not designated under hedge accounting are recognized in financial income and expenses in the consolidated income statement.

Embedded derivatives included in contracts, if any, are identified and monitored by the Group. For host contracts that are not financial assets containing embedded derivatives that are not closely related, the embedded derivatives are separated and measured at fair value as of each reporting date with changes in fair value recognized in financial income and expenses in the consolidated income statement. For host contracts that are financial assets containing embedded derivatives the whole contract is measured at fair value as of each reporting date with changes in fair value recognized in financial income and expenses in the consolidated income statement.

Hedge accounting

The Group applies hedge accounting on certain foreign exchange forward contracts, options or option strategies, and interest rate derivatives. Qualifying options and option strategies have zero net premium, or a net premium paid. For option structures, the critical terms of the purchased and written options are the same and the nominal amount of the written option component is not greater than that of the purchased option.

In the fair valuation of foreign exchange forward contracts, the Group separates the spot element and the forward element including the impact of foreign currency basis and forward points, that is considered as the cost of hedging for foreign exchange forward contracts. In the fair valuation of foreign exchange option contracts, the Group separates the intrinsic value and time value, that is considered as the cost of hedging for foreign exchange option contracts. In the fair valuation of cross currency swaps, the Group separates the foreign currency basis spread that is considered as the cost of hedging for cross currency swaps.

Cash flow hedges: hedging of forecast foreign currency denominated sales and purchases

The Group applies cash flow hedge accounting primarily to forecast business foreign exchange exposure that arises from highly probable forecast operative business transactions. The risk management strategy is to hedge material net exposures (identified standard sales exposure minus identified standard costs exposure) by using foreign exchange forwards and foreign exchange options in a layered hedging style that follows defined hedge ratio ranges and hedge maturities in quarterly time buckets. The hedged item must be highly probable and present an exposure to variations in cash flows that could ultimately affect profit or loss.

The Group only designates the spot element of the foreign exchange forward contract as the hedging instrument. Currency options, or option strategies, may also be used for cash flow hedging, in which case the intrinsic value of the option is designated as the hedging instrument. Hedge effectiveness is assessed at inception and quarterly during the hedge relationship to ensure that an economic relationship exists. As the Group only enters in hedge relationships where the critical terms match, the assessment of effectiveness is done on a qualitative basis.

For qualifying foreign exchange forwards and foreign exchange options, the change in fair value that reflects the change in spot exchange rates on a discounted basis is recognized in hedging reserve in other comprehensive income. The changes in the forward element of the foreign exchange forwards and the time value of the options that relate to hedged items are deferred in the cost of hedging reserve in other comprehensive income and are subsequently accounted for in the same way as the spot element or intrinsic value.

In each quarter the Group evaluates whether the forecast sales and purchases are still expected to occur. If a portion of the hedged cash flow is no longer expected to occur, all related deferred gains or losses are derecognized from other comprehensive income and recognized in other income and expenses in the consolidated income statement as hedge accounting criteria is no longer met. If the hedged cash flow ceases to be highly probable, but is still expected to occur, accumulated gains and losses remain in other comprehensive income until the hedged cash flow affects profit or loss.

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The Group's risk management objective is to hedge forecast cash flows until the related revenue has been recognized. Each hedge relationship is discontinued during the quarter when the hedge matures, which is also the quarter that it has been designated to hedge. At this point the accumulated profit or loss of cash flow hedges is recycled to other income and expenses in the consolidated income statement. In case the forecast amount of revenue is not recognized during a quarter, the full accumulated profit or loss of cash flow hedges designated for said quarter is still recycled and the portion related to forecast revenue that was not recognized is disclosed as hedge ineffectiveness.

As cash flow hedges mature in the same quarter as the hedged item, there is no significant ineffectiveness resulting from time value of money. The group will validate the magnitude of the impact of discounting related to the amount of profit or loss recognized in other comprehensive income on a quarterly basis.

The Group also applies cash flow hedging to future interest cash flows in foreign currency related to issued bonds. These future interest cash flows are hedged with cross currency swaps that have been designated partly as fair value hedges and partly as cash flow hedges. The accumulated profit or loss for the part of these cross currency swaps designated as cash flow hedges is initially recorded in hedging reserve and recycled to profit or loss at the time when the related interest cash flows are settled. The Group separates the foreign currency basis spread from cross currency swaps and excludes it from the hedge relationship as cost of hedging that is initially recognized and subsequently measured at fair value and recorded in cost of hedging reserve in other comprehensive income.

The Group has also entered into foreign exchange forwards in relation to forecast sales and purchases that do not qualify as highly probable forecast transactions and hence do not satisfy the requirements for hedge accounting. For these foreign exchange forwards the gains and losses are recognized in other income and expenses in the consolidated income statement.

Cash flow hedges: hedging of foreign currency risk of highly probable business acquisitions and other transactions

From time to time the Group hedges the cash flow variability due to foreign currency risk inherent in highly probable business acquisitions and other future transactions that result in the recognition of non-financial assets. Due to hedge accounting the fair value changes of the hedging instrument is deferred to hedging reserve in other comprehensive income and when those non-financial assets are recognized in the statement of financial position, the accumulated gains and losses are derecognized from hedging reserve and included in the initial acquisition cost of the asset. The deferred amounts are ultimately recognized in the consolidated income statement as a result of goodwill assessments for business acquisitions and through depreciation or amortization for other assets. The application of hedge accounting is conditional on the forecast transaction being highly probable and the effectiveness assessment ensuring that an economic relationship exists between the hedging instruments and the hedged item.

The Group only designates the spot element of the foreign exchange forward contract as the hedging instrument. Currency options, or option strategies, may also be used for cash flow hedging, in which case the intrinsic value of the option is designated as the hedging instrument. For qualifying foreign exchange forwards and foreign exchange options, the change in fair value that reflects the change in spot exchange rates on a discounted basis is recognized in hedging reserve in other comprehensive income. The changes in the forward element of the foreign exchange forwards and the time value of the options that relate to hedged items are deferred in the cost of hedging reserve in other comprehensive income and are subsequently accounted for in the same way as the spot element or intrinsic value.

Fair value hedges: hedging of foreign exchange exposure

In certain cases, mainly related to long-term construction projects, the Group applies fair value hedge accounting for foreign exchange risk with the objective to reduce the exposure to fluctuations in the fair value of firm commitments

due to changes in foreign exchange rates. Changes in the fair value of both spot and forward elements of the derivatives designated and qualifying as fair value hedges, together with any changes in the fair value of the hedged firm commitments attributable to the hedged risk, are recorded in financial income and expenses in the consolidated income statement.

Fair value hedges: hedging of interest rate exposure

The Group applies fair value hedge accounting to reduce exposure to fair value fluctuations of interest-bearing liabilities due to changes in interest rates and foreign exchange rates. The Group uses interest rate swaps and cross currency swaps aligned with the hedged items to hedge interest rate risk and associated foreign exchange risk.

The Group has entered into long-term borrowings mainly at fixed rate and swapped a portion of them into floating rates in line with a defined target interest profile. The Group aims to mitigate the adverse impacts from interest rate fluctuations by continuously managing net interest exposure resulting from financial assets and liabilities by setting appropriate risk management benchmarks and risk limits. The hedged item is identified as a proportion of the outstanding loans up to the notional amount of the swaps as appropriate to achieve the risk management objective. The group enters into interest rate swaps that have similar critical terms as the hedged item, such as reference rate, reset dates, payment dates, maturities and notional amount. The Group has not entered into interest rate swaps where it would be paying fixed rate.

The Group's borrowings are carried at amortized cost. Changes in the fair value of derivatives designated and qualifying as fair value hedges, together with any changes in the fair value of hedged liabilities attributable to the hedged risk, are recorded in financial income and expenses in the consolidated income statement. The Group separates the foreign currency basis spread from cross currency swaps and excludes it from the hedged risk as cost of hedging that is initially recognized and subsequently measured at fair value and recorded in cost of hedging reserve in other comprehensive income. If the hedged item no longer meets the criteria for hedge accounting, hedge accounting ceases and any fair value adjustments made to the carrying amount of the hedged item as well as cost of hedging recorded in cost of hedging reserve while the hedge was effective are recognized in financial income and expenses in the consolidated income statement based on the effective interest method.

Hedges of net investments in foreign operations

The Group applies hedge accounting for its foreign currency hedging of selected net investments. Hedged item can be an amount of net assets equal to or less than the carrying amount of the net assets of the foreign operation in the Group consolidated financial statements. The risk management strategy is to protect the euro counter value of the portion of this exposure expected to materialize as non-euro cash repatriation in the foreseeable future.

The Group only designates the spot element of the foreign exchange forward contract as the hedging instrument. Currency options, or option strategies, may also be used for net investment hedging, in which case the intrinsic value of the option is designated as the hedging instrument.

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Hedge effectiveness is assessed at inception and quarterly during the hedge relationship to ensure that an economic relationship exists. As the Group only enters in hedge relationships where the critical terms match, the assessment of effectiveness is done on a qualitative basis.

For qualifying foreign exchange forwards, foreign exchange options and option strategies, the change in fair value that reflects the change in spot exchange rates is recognized in translation differences within consolidated shareholders' equity. The changes in the forward element of foreign exchange forwards as well as the changes in the time value of options (collectively known as the "cost of hedging") is recognized in cost of hedging reserve in other comprehensive income. The cost of hedging at the date of designation of the foreign exchange forward or option contract as a hedging instrument is amortized to financial income and expenses in the consolidated income statement over the duration of the contract. Hence, in each reporting period, the change in fair value of forward element of the foreign exchange forward contract or time value of the option contract is recorded in cost of hedging reserve, whilst the amortization amount is reclassified from cost of hedging reserve to profit or loss.

Accumulated changes in fair value from qualifying hedges are derecognized from translation differences within consolidated shareholders' equity on the disposal of all or part of a foreign subsidiary by sale, liquidation, repayment of share capital or abandonment. The cumulative amount or proportionate share of changes in the fair value of qualifying hedges deferred in translation differences is recognized as income or expense when the gain or loss on disposal is recognized.

Provisions

Provisions are recognized when the Group has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation and a reliable estimate of the amount can be made. When the Group expects a provision to be reimbursed, the reimbursement is recognized as an asset only when the reimbursement is virtually certain. The Group assesses the adequacy of its existing provisions and adjusts the amounts as necessary based on actual experience and changes in facts and circumstances as of each reporting date.

Restructuring provisions

The Group provides for the estimated cost to restructure when a detailed formal plan of restructuring has been completed, approved by management, and announced. Restructuring costs consist primarily of personnel restructuring charges. The other main components are costs associated with exiting real estate locations, and costs of terminating certain other contracts directly linked to the restructuring.

Warranty provisions

The Group provides for the estimated liability to repair or replace products under standard warranty at the time revenue is recognized. The provision is an estimate based on historical experience of the level of repairs and replacements.

Litigation provisions

The Group provides for the estimated future settlements related to litigation based on the probable outcome of potential claims.

Environmental provisions

The Group provides for estimated costs of environmental remediation relating to soil, groundwater, surface water and sediment contamination when the Group becomes obliged, legally or constructively, to rectify the environmental damage, or to perform restorative work.

Project loss provisions

Project loss provisions relate to contracts with customers and are evaluated at a contract level. The Group provides for onerous contracts based on the lower of the expected cost of fulfilling the contract and the expected cost of terminating the contract. An onerous contract is a contract in which the unavoidable costs of meeting the obligations under the contract exceed the economic benefits expected to be received under it.

Divestment-related provisions

The Group provides for indemnifications it is required to make to the buyers of its disposed businesses.

Material liability provisions

The Group recognizes the estimated liability for non-cancellable purchase commitments for inventory in excess of forecasted requirements at each reporting date.

Other provisions

The Group provides for uncertain taxes, other legal and constructive obligations based on the expected cost of executing any such commitments.

Treasury shares

The Group recognizes its own equity instruments that are acquired (treasury shares) as a reduction of equity at cost of acquisition. When cancelled, the acquisition cost of treasury shares is recognized in retained earnings or other distributable funds of the equity.

Dividends

Until 2018, Dividends proposed by the Board of Directors were recognized in the consolidated financial statements when they were approved by the shareholders at the Annual General Meeting. From 2019 onwards, and applicable for the first time for distribution of funds for 2018, dividends and capital repayments are recognized in the consolidated financial statements when the Board of Directors has approved the quarterly payment in accordance with the authorization granted by Annual General Meeting.

3. New and amended standards and interpretations

New and amended standards and interpretations adopted

The Group has adopted IFRS 9, Financial Instruments (IFRS 9) and IFRS 15, Revenue from Contracts with Customers (IFRS 15) on their effective date of January 1, 2018. The impact of adoption on the Group's consolidated financial statements is described in detail below.

Other amendments and interpretations effective in 2018 did not have a material impact on the Group's consolidated financial statements.

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The following table shows the adjustments recognized for each individual line item in the consolidated statement of financial position. Line items that were not affected by the changes have not been included, and as a result, the subtotals and totals cannot be calculated from the numbers provided. The adjustments are explained in more detail by standard below.

Consolidated statement of financial position (extract):

EURm	December 31, 2017	IFRS 9	IFRS 15	January 1, 2018
ASSETS				
Non-current financial investments	–	679	–	679
Available-for-sale investments	816	(816)	–	–
Deferred tax assets	4 582	9	–	4 591
Other non-current financial assets	215	132	–	347
Non-current assets	21 160	4	–	21 164
Trade receivables	6 880	(46)	(1 728)	5 106
Contract assets	–	–	1 919	1 919
Prepaid expenses and accrued income	1 259	–	(217)	1 042
Other financial assets	302	4	–	306
Current financial investments	–	907	–	907
Available-for-sale investments, liquid assets	911	(911)	–	–
Current assets	19 841	(46)	(26)	19 769
Total assets	41 024	(43)	(26)	40 955
SHAREHOLDERS' EQUITY AND LIABILITIES				
Fair value and other reserves	1 094	(252)	–	842
Retained earnings	1 147	214	(16)	1 345
Total equity	16 218	(38)	(16)	16 164
Deferred tax liabilities	413	(5)	(5)	403
Contract liabilities	–	–	1 216	1 216
Deferred revenue and other long-term liabilities	2 986	–	(1 216)	1 770
Non-current liabilities	12 062	(5)	(5)	12 052
Contract liabilities	–	–	2 478	2 478
Accrued expenses, deferred revenue and other liabilities	6 666	–	(2 483)	4 183
Current liabilities	12 744	–	(5)	12 739
Total shareholders' equity and liabilities	41 024	(43)	(26)	40 955

IFRS 9 Financial Instruments

IFRS 9, Financial Instruments, was issued in July 2014 and it replaces IAS 39, Financial Instruments: Recognition and Measurement (IAS 39). IFRS 9 addresses the classification and measurement of financial assets and liabilities, introduces a new impairment model and a new hedge accounting model. On adoption, the Group has not restated comparative periods but presents the cumulative effect of adopting IFRS 9 as a transition adjustment to the opening balance of other comprehensive income and retained earnings as of January 1, 2018.

The effect of changes to the Group's financial statement due to the adoption of IFRS 9 are described below. For IFRS 9 compliant accounting principles for financial instruments, refer to Note 2, Significant accounting policies.

Classification and measurement of financial assets

The Group has classified its financial assets in the following three categories: financial assets measured at amortized cost, financial assets measured at fair value through other comprehensive income and financial assets measured at fair value through profit and loss. The selection of the appropriate category is based both on the Group's business model for managing the financial asset and on the contractual cash flows characteristics of the financial asset. The new asset classes replace the following IAS 39 asset classification categories: available-for-sale investments, derivative and other current financial assets, loan receivables, trade receivables, financial assets at fair value through profit or loss.

Non-current Investments: Investments in unlisted private equity shares, technology-related publicly quoted shares and unlisted venture funds are classified as fair value through profit and loss. Under IAS 39 these items were classified as available-for-sale. Fair valuation is recorded in other income and expenses based on the business model assessment performed in conjunction with IFRS 9 transition.

Other non-current financial assets: Restricted bank deposits are classified as amortized cost. Under IAS 39 these items were classified as available-for-sale.

Loan receivables: The Group's business model for managing loans to customers and suppliers is both to collect contractual cash flows and to sell assets and hence customer finance assets are initially recognized and subsequently re-measured at fair value through other comprehensive income. Under IAS 39 these items were measured at amortized cost less impairment using the effective interest method.

Derivatives: There is no change in the classification or measurement of derivative assets not designated in hedge accounting relationships apart from embedded derivatives: based on IFRS 9, the whole contract is evaluated based on the classification criteria and then classified as its entirety. Based on IAS 39 embedded derivatives were measured at fair value through profit and loss.

Current Investments: Fixed income and money market securities are classified as fair value through other comprehensive income in case the instrument characteristics fulfil the criteria of payments of solely principal and interest and are not part of a structured investment (formerly classified as available-for-sale investments). Other investments are classified at fair value through profit or loss.

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Trade receivables: The Group's business model for managing trade receivables is holding receivables to collect contractual cash flows and selling receivables. Hence, trade receivables are initially recognized at notional amounts and subsequently re-measured at fair value through other comprehensive income. IAS 39 measured these trade receivables at amortized cost.

Classification and measurement of financial liabilities

The Group classifies derivative liabilities at fair value through profit and loss and all other financial liabilities at amortized cost. These category classes replace the IAS 39 classes derivative and other financial liabilities, compound financial instruments, loans payable, and account payable. The implementation of IFRS 9 has not had a material effect on the classification and measurement of financial liabilities.

Impairment

The Group assesses expected credit losses on financial assets on a forward-looking basis whereas the impairment provision under IAS 39 was based on actual credit losses. Expected credit losses are calculated based on credit rating profile and estimated recovery rate as well as any other specific indicators on counterparty creditworthiness. The impairment requirements concern the following financial assets: customer loans and current investments measured at fair value through other comprehensive income, financial assets measured at amortized cost as well as financial guarantee contracts and loan commitments. Based on the Group's assessment of these financial assets at the reporting date only the expected credit loss for customer loans and loan commitments was not deemed immaterial.

A loss allowance is recognized based on 12-month expected credit losses unless the credit risk for the financial instrument has increased significantly since initial recognition. For trade receivables and contract assets, the Group applies a simplified approach to recognizing a loss allowance based on lifetime expected credit losses.

Hedge accounting

As the Group's foreign exchange risk management policy and hedge accounting model have been aligned with the requirements of IFRS 9, all hedging relationships qualify for treatment as continuing hedging relationship. The requirement for hedge effectiveness of 80-125 % has been removed from IFRS 9 and the effectiveness of hedging is evaluated based on the economic relationship between the hedging instrument and hedged item. The Group is separating the forward element and the spot element of a foreign exchange forward contract and designates as the hedging instrument only the change in the value of the spot element of the foreign exchange forward contract. The Group also separates the time value of options and the foreign currency basis spread of cross currency swaps. These hedging costs are mainly recognized in other comprehensive income and subsequently accounted for in the same way as the intrinsic value. Under IAS 39 these costs were recognized in profit and loss as they occurred.

The monetary and line-by-line impact of the changes to classification and measurement of financial assets in the consolidated statement of financial position is described in more detail below.

	IAS 39	IFRS 9	December	January	Change in	Change in
EURm	classification	classification	31, 2017 (IAS 39)	1, 2018 (IFRS 9)	classification	measurement
Non-current financial investments(1)						
Investments in private equity(2)	Available-for-sale	FVPL	679	679		
Restricted bank deposits(3)	Available-for-sale		137		(137)	

		Amortized cost			
Other non-current financial assets					
Restricted bank deposits(3)	Available-for-sale	Amortized cost	137	137	
Non-current customer financing(4)	Amortized cost	FVOCI	75	70	(5)
Other non-current financial assets	FVPL	FVPL	107	107	
Other non-current financial assets	Amortized cost	Amortized cost	33	33	
Other current financial assets including derivatives					
Derivatives	FVPL	FVPL	196	196	
Current portion of customer financing(4)	Amortized cost	FVOCI	84	84	
Other current financial assets(3)	Amortized cost	Amortized cost	22	26	4
Trade receivables					
Trade receivables(5)	Amortized cost	FVOCI	6 880	6 834	(46)
Current financial investments(1)					
Available-for-sale investments, liquid assets(6)	FVOCI	FVPL		84	84
Available-for-sale investments, liquid assets(3)(6)	FVOCI	FVOCI	911	823	(88)
Cash and cash equivalents					
Financial investments at fair value through profit and loss	Amortized cost	FVPL	1 962	1 962	
Financial investments at amortized cost	Amortized cost	Amortized cost	5 407	5 407	
Deferred tax assets and liabilities					
Deferred tax assets			4 582	4 591	9
Deferred tax liabilities			413	408	(2) (3)
Shareholders' equity					
Fair value and other reserves(2)(4)(5)(7)(8)			1 094	842	(210) (42)
Retained earnings(2)(7)(8)			1 147	1 361	212 2

(1) In 2017, Non-current financial investments were presented as Available-for-sale investments and Current financial investments were presented as Available-for-sale investments, liquid assets under IAS 39.

(2) Upon initial application of IFRS 9, the accumulated net positive fair value changes for the Group's investments in venture funds, a gain of EUR 226 million, formerly recorded to other comprehensive income, has been presented as a transition adjustment to opening balance of retained earnings. There was no change in the valuation nor carrying amount of these assets.

(3) Certain restricted bank deposits classified mainly as non-current available-for-sale investments under IAS 39 are classified as amortized cost. There was no change in the carrying amount of these deposits.

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- (4) The initial fair value adjustment for customer finance assets of a loss of EUR 5 million has been presented in opening balance of other comprehensive income as a transition adjustment.
- (5) The initial fair value adjustment for trade receivables of a loss of EUR 46 million has been presented in opening balance of other comprehensive income as a transition adjustment.
- (6) The Group has assessed the investments classified under IAS 39 as current available-for-sale, liquid assets, and has classified certain investment funds to be measured at fair value through profit or loss at the adoption of IFRS 9. The rest of these investments satisfy the conditions for classification at fair value through other comprehensive income.
- (7) The Group has assessed the impact of the new impairment model. As the credit quality of the Group's fixed income and money market investments is high, there is no significant impact from the new model. There was an impact of EUR 9 million loss to loans extended to the Group's customers as the new model results in an earlier recognition of credit losses that has been recorded in opening balance of other comprehensive income and retained earnings as a transition adjustment.
- (8) For cash flow hedge accounting, the Group has elected to defer cost of hedging in other comprehensive income until the hedged item impacts profit and loss. As a result, a loss of EUR 10 million for accumulated cost of hedging related to hedges under cash flow hedge accounting at the end of 2017 has been presented in opening balance of other comprehensive income and retained earnings as a transition adjustment. For net investment hedge accounting, The Group has elected to defer cost of hedging in other comprehensive income and amortize it over the duration of the hedge. The initial adjustment related to treatment of cost of net investment hedging was not significant.

The numbers presented in the footnotes above are gross of tax. The tax impact of IFRS 9 transition adjustments has been recorded to deferred tax assets, deferred tax liabilities, fair value and other reserves or retained earnings as applicable.

IFRS 15 Revenue from Contracts with Customers

On January 1, 2018, the Group adopted IFRS 15, Revenue from Contracts with Customers. IFRS 15 establishes a five-step model that applies to revenue arising from contracts with customers and replaces IAS 18, Revenue, and IAS 11, Construction contracts. Under IFRS 15, revenue is recognized to reflect the transfer of promised goods and services to customers for amounts that reflect the consideration to which the Group expects to be entitled in exchange for those goods and services.

The Group adopted the standard by applying the modified retrospective transition method to all contracts that were not completed contracts at the date of adoption and has presented the cumulative effect of adopting IFRS 15 as an adjustment to the opening balance of retained earnings as of January 1, 2018. The IFRS 15 adoption-related adjustments to the year-end 2017 consolidated statement of financial position and the resulting 2018 opening balance sheet are presented above. Adoption of the standard resulted in a post-tax decrease of retained earnings of EUR 16 million in the opening balance sheet of 2018, with offsetting entries in contract assets and contract liabilities.

The main impacts of the adoption of IFRS 15 are summarized below including a significant change in presentation within the consolidated statement of financial position.

Identification of a contract

In accordance with IFRS 15, management concluded that only legally enforceable rights should be considered in evaluating the accounting for contracts with customers. As such, frame agreements are accounted for based on the issuance of subsequent purchase orders under the frame agreements. Previously, a broader contract definition was permitted for accounting purposes.

Software revenue

In accordance with IFRS 15, revenue related to licenses and other software is recognized over time or at the point in time when a performance obligation is satisfied. Previously, certain software revenue arrangements were recorded as revenue over a fixed term subscription period. Upon the adoption of IFRS 15, this change may result in larger fluctuations in revenue between quarters than under the previous standard. In 2018, this change did not have a material impact.

Establishment of contract asset and contract liability balances

Upon adoption of IFRS 15, the Group has established contract asset and contract liability balances for each of its customer contracts in its consolidated statement of financial position, depending on the relationship between the Group's performance and the customer's payment for each individual contract. On a net basis, a contract asset position represents where the Group has performed by transferring goods or services to a customer before the customer has paid the consideration or payment is due. Conversely, a contract liability position represents where a customer has paid the consideration or payment is due, but the Group has not yet transferred goods or services to the customer. Upon adoption of the standard, the Group identified discount accruals that do not require the customer to purchase additional goods and services and should thus be presented separately from contract liabilities in the consolidated statement of financial position. Refer to Note 28, Accrued expenses, deferred revenue and other liabilities.

New and amended standards and interpretations issued but not yet effective

The following new and revised standards, amendments and interpretations to existing standards that have been issued by the IASB but are not yet effective are expected to be relevant to the Group's operations and financial position when adopted.

Other new and revised standards, amendments and interpretations to existing standards issued by the IASB that are not yet effective, except what has been described below, are not expected to have a material impact on the consolidated financial statements of the Group when adopted.

The Group has not early adopted any standard, interpretation or amendment that has been issued but is not yet effective.

IFRS 16 Leases

IFRS 16, Leases, (IFRS 16) was issued in January 2016 and sets out the requirements for the recognition, measurement, presentation and disclosure of leases. IFRS 16 provides a single lessee accounting model, requiring lessees to recognize right-of-use assets and lease liabilities for most leases, excluding short-term leases, in the consolidated statement of financial position.

The Group will adopt IFRS 16 on the effective date of January 1, 2019 using the cumulative catch-up transition method. In accordance with the IFRS 16 transition guidance, comparative information will not be restated. On adoption, all right-of-use assets (prior to adjustment for prepaid assets, accrued lease payments and onerous lease contract provisions) will be recorded with an equivalent value recorded for the related lease liabilities. Key judgments and estimates used under IFRS 16 primarily relate to the evaluation of lease terms and the use of discount rates.

In Note 30, Commitments and contingencies, the Group disclosed non-cancellable operating lease commitments of EUR 1 099 million, of which the majority relates to real estate operating lease commitments. As of the date of this 20-F, the impact of the new standard on the Group's financial statements is not reasonably estimable. The Group expects that the lease liability recorded at the date of adoption will differ from non-cancellable lease commitments mainly due to excluding non-cancellable operating lease commitments for onerous lease contracts and for properties not

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available for use by the Group at the adoption date, the judgments of including lease extension option periods in determining lease term and the impact from discounting future lease payments to present value.

IFRS 16 allows for entities to elect a number of practical expedients to simplify the initial adoption of IFRS 16, as well as the ongoing application of IFRS 16.

The Group will elect to adopt the following practical expedients upon transition:

- § The Group will apply IFRS 16 to contracts that were previously identified as leases applying IAS 17, Leases, and IFRIC 4, Determining whether an Arrangement contains a Lease;
- § The Group will adjust the right-of-use assets by the amount of onerous lease contract provisions recognized in the consolidated statement of financial position in accordance with IAS 37, Provisions, Contingent Liabilities and Contingent Assets;
- § The Group will exclude initial direct costs related to the execution of lease contracts from the measurement of the right-of-use assets; and
- § The Group will apply hindsight to estimate the lease term for all lease contracts existing on the effective date of January 1, 2019.

The Group will elect to adopt the following practical expedients on an ongoing basis:

- § The Group will not separate non-lease components from lease components and will instead account for each lease component and associated non-lease component as a single lease component; and
- § The Group will not recognize any short-term leases on the consolidated statement of financial position where the lease term is 12 months or less at the lease commencement date. Instead, the Group will recognize the lease payments associated with short-term leases as an expense recognized on a basis representative of the pattern of the lease's benefit.

4. Use of estimates and critical accounting judgments

The preparation of consolidated financial statements requires use of management judgment in electing and applying accounting policies as well as in making estimates that involve assumptions about the future. These judgments, estimates and assumptions may have a significant effect on the consolidated financial statements.

The estimates used in determining the carrying amounts of assets and liabilities subject to estimation uncertainty are based on historical experience, expected outcomes and various other assumptions that were available when these consolidated financial statements were prepared, and they are believed to be reasonable under the circumstances. The estimates are revised if changes in circumstances occur, or as a result of new information or more experience. As estimates inherently contain a varying degree of uncertainty, actual outcomes may differ, resulting in additional charges or credits to the consolidated income statement.

Management considers that the estimates, assumptions and judgments about the following accounting policies represent the most significant areas of estimation uncertainty and critical judgment that may have an impact on the consolidated financial statements.

Business combinations

The Group applies the acquisition method to account for acquisitions of separate entities or businesses. The determination of the fair value and allocation thereof to each separately identifiable asset acquired and liability assumed as well as the determination of the acquisition date, when the valuation and allocation is to be conducted require estimation and judgment.

Estimation and judgment are required in determining the fair value of the acquisition, including the discount rate, the terminal growth rate, the number of years on which to base the cash flow projections, and the assumptions and estimates used to determine the cash inflows and outflows. The discount rate reflects current assessments of the time value of money, relevant market risk premiums, and industry comparisons. Risk premiums reflect risks and uncertainties for which the future cash flow estimates have not been adjusted. Terminal values are based on the expected life of products and forecasted life cycle, and forecasted cash flows over that period. The assumptions are based on information available at the date of acquisition; actual results may differ materially from the forecast as more information becomes available. Refer to Note 6, Acquisitions and disposals.

Revenue recognition

In addition to those identified within the significant accounting policies in the revenue recognition section of Note 2, Significant accounting policies, management has identified the following estimates and critical accounting judgments necessary in the determination of revenue to be recognized each period.

Contract modifications

A significant part of the Group's business is conducted under framework agreements with no fixed commitment on the overall project scope. The accounting treatment of subsequent purchase commitments received from the customer in the form of new purchase orders is a critical judgment. Subsequent purchase orders may be deemed either to represent separate contracts or to represent a modification of the existing contract, which requires combination with the original contract for accounting purposes.

The decision whether to segregate or combine subsequent purchase orders can have a direct impact on the amount of revenue recognized in a given period for arrangements with multiple performance obligations including material rights as the transaction price is allocated to the performance obligations identified within the contract.

Determining and allocating the transaction price

As the Group often provides complex and extensive networking solutions, the contracts for these may contain complex pricing structures, many of which include discount programs that range from volume-based discounts to lumpsum discounts provided upon entering the contract. The revenue recognized for any contract always reflects the net impact of list price and any estimated or actual discounts. Revenue is only recognized to the extent that it is highly probable that a significant reversal will not occur.

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When the Group enters into contracts with customers consisting of any combination of hardware, services and software, separate performance obligations are identified and accounted for based on their nature, considering the economic substance of the entire arrangement. Hardware and software sold by the Group includes warranty, which can either be assurance-type for repair of defects and recognized as a centralized warranty provision (refer to Note 29, Provisions), or service-type for scope beyond the repair of defects or for a time period beyond the standard assurance-type warranty period and considered a separate performance obligation within the context of the contract. Revenue is allocated to each performance obligation based on its standalone selling price in relation to the overall transaction price. The standalone selling price of each performance obligation is determined by considering factors such as the price of the performance obligation if sold on a standalone basis and the expected cost of the performance obligation plus a reasonable margin when price references are not available. The portion of the transaction price allocated to each performance obligation is then recognized when the revenue recognition criteria for that performance obligation have been met. The determination of the standalone selling price for each performance obligation and the resulting allocation of the total transaction price to each performance obligation require the use of estimates and judgment that may have a significant impact on the timing and amount of revenue recognized.

In some customer contracts, the timing of revenue recognition and collection of the consideration are more than a year apart and therefore may contain a significant financing component that must be recognized separately from revenue associated with the arrangement's performance obligations. In these cases, the Group values the financing component embedded in the contract based on applicable market rates and excludes it from the transaction price if considered significant. Such financing components are presented within financial income and expense. The Group does not adjust the promised amount of consideration for the effects of a significant financing component if it expects, at contract inception, that the period between when the promised good or service transfers to the customer and when the Group collects payment for that good or service, will be one year or less.

Refer to Note 8, Revenue recognition, for further details on revenue recognition in 2018.

Pension and other post-employment benefit obligations and expenses

The determination of pension and other post-employment benefit obligations and expenses for defined benefit plans is dependent on a number of estimates and assumptions, including the discount rate, future mortality rate, annual rate of increase in future compensation levels, and healthcare costs trend rates and usage of services in the United States where the majority of our post-employment healthcare plans are maintained. A portion of plan assets is invested in debt and equity securities, which are subject to market volatility. Changes in assumptions and actuarial estimates may materially affect the benefit obligation, future expense and future cash flow. Based on these estimates and assumptions, defined benefit obligations amount to EUR 23 955 million (EUR 25 497 million in 2017) and the fair value of plan assets amounts to EUR 24 479 million (EUR 25 535 million in 2017). Refer to Note 27, Pensions and other post-employment benefits.

Income taxes

The Group is subject to income taxes in the jurisdictions in which it operates. Judgment is required in determining current tax expense, uncertain tax positions, deferred tax assets and deferred tax liabilities; and the extent to which deferred tax assets can be recognized.

Estimates related to the recoverability of deferred tax assets are based on forecasted future taxable income and tax planning strategies. Based on these estimates and assumptions, the Group has EUR 20 465 million (EUR 20 365 million in 2017) of temporary differences, tax losses carry forward and tax credits for which no deferred tax assets are recognized due to uncertainty of utilization. The majority of the unrecognized deferred tax assets relate to France. Refer to Note 13, Income taxes.

The utilization of deferred tax assets is dependent on future taxable profit in excess of the profit arising from the reversal of existing taxable temporary differences. The recognition of deferred tax assets is based on the assessment of whether it is more likely than not that sufficient taxable profit will be available in the future to utilize the reversal of deductible temporary differences, unused tax losses and unused tax credits before the unused tax losses and unused tax credits expire. Recognition of deferred tax assets involves judgment regarding the future financial performance of the particular legal entity or tax group that has recognized the deferred tax asset.

Liabilities for uncertain tax positions are recorded based on estimates and assumptions of the amount and likelihood of outflow of economic resources when it is more likely than not that certain positions may not be fully sustained upon review by local tax authorities. Currently, the Group has ongoing tax investigations in multiple jurisdictions, including Canada, India, Saudi Arabia and South Korea. Due to the inherently uncertain nature of tax investigations, the ultimate outcome or actual cost of settlement may vary materially from estimates. Refer to Note 13, Income taxes.

Goodwill recoverability

The recoverable amounts of the groups of CGUs were based on fair value less costs of disposal that was determined using a level 3 fair value measurement based on a discounted cash flow calculation. The cash flow projections used in calculating the recoverable amounts were based on financial plans approved by management covering an explicit forecast period of three years. Seven additional years of cash flow projections subsequent to the explicit forecast period reflect a gradual progression towards the steady state cash flow projections modeled in the terminal year. Estimation and judgment are required in determining the components of the recoverable amount calculation, including the discount rates, the terminal growth rates, estimated revenue growth rates, gross margins and operating margins. The discount rates reflect current assessments of the time value of money and relevant market risk premiums reflecting risks and uncertainties for which the future cash flow estimates have not been adjusted. The terminal growth rate assumptions reflect long-term average growth rates for the industry and economies in which the groups of CGUs operate.

The results of the impairment testing indicate adequate headroom for each group of CGUs. Total goodwill amounts to EUR 5 452 million as of December 31, 2018 (EUR 5 248 million in 2017). Refer to Note 15, Intangible assets and Note 17, Impairment.

Loss allowances

Loss allowances are recognized for estimated losses resulting from customers' inability to meet payment obligations. Following the adoption of IFRS 9, the Group applies a simplified approach to recognizing a loss allowance on trade receivables based on measurement of lifetime expected credit losses arising from trade receivables without significant financing components. Estimation and judgment are required in determining the value of loss allowances at each reporting date. Management specifically analyzes trade receivables and historical losses; customer concentrations; customer creditworthiness; past due balances; current economic trends; and changes in customer payment terms when

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determining loss allowances. In addition to past events and current conditions, reasonable and supportable forecasts affecting collectability are considered when determining the amount of loss allowances. Based on these estimates and assumptions, loss allowances are EUR 195 million as of December 31, 2018 (EUR 192 million in 2017), representing 3% of trade receivables and contract assets (3% in 2017). Refer to Note 36, Financial risk management.

Allowances for excess and obsolete inventory

Allowances for excess and obsolete inventory are recognized for excess amounts, obsolescence and declines in net realizable value below cost. Estimation and judgment are required in determining the value of the allowance for excess and obsolete inventory at each reporting date. Management specifically analyzes estimates of future demand for products when determining allowances for excess and obsolete inventory. Changes in these estimates could result in revisions to the valuation of inventory in future periods. Based on these estimates and assumptions, allowances for excess and obsolete inventory are EUR 521 million (EUR 432 million in 2017), representing 14% of inventory (14% in 2017). Refer to Note 18, Inventories.

Fair value of derivatives and other financial instruments

The fair value of derivatives and other financial instruments that are not traded in an active market such as unlisted equities is determined using valuation techniques. Estimation and judgment are required in selecting an appropriate valuation technique and in determining the underlying assumptions. Where quoted market prices are not available for unlisted shares, the fair value is based on a number of factors including, but not limited to, the current market value of similar instruments; prices established from recent arm's-length transactions; and/or analysis of market prospects and operating performance of target companies with reference to public market comparable companies in similar industry sectors. Changes in these estimates could result in losses in future periods. Based on these estimates and assumptions, the fair value of derivatives and other financial assets that are not traded in an active market, using non-observable data (level 3 of the fair value hierarchy), is EUR 688 million (EUR 552 million in 2017), representing 8% of total financial assets measured at fair value on a recurring basis (29% in 2017). Level 3 financial liabilities include conditional obligation to China Huaxin as part of the Nokia Shanghai Bell definitive agreements where China Huaxin obtained the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group in exchange for a future cash settlement. The total level 3 financial liabilities amount to EUR 707 million (EUR 672 million in 2017), representing 78% of total financial liabilities (71% in 2017) measured at fair value on a recurring basis. Refer to Note 24, Fair value of financial instruments.

Provisions

Provisions are recognized when the Group has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation, and a reliable estimate of the amount can be made. At times, judgment is required in determining whether the Group has a present obligation; estimation is required in determining the value of the obligation. Whilst provisions are based on the best estimate of unavoidable costs, management may be required to make a number of assumptions surrounding the amount and likelihood of outflow of economic resources, and the timing of payment. Changes in estimates of timing or amounts of costs to be incurred may become necessary as time passes and/or more accurate information becomes available. Based on these estimates and assumptions, provisions amount to EUR 1 427 million (EUR 1 888 million in 2017). Refer to Note 29, Provisions.

Legal contingencies

Legal proceedings covering a wide range of matters are pending or threatened in various jurisdictions. Provisions are recognized for pending litigation when it is apparent that an unfavorable outcome is probable and a best estimate of

unavoidable costs can be reasonably estimated. Due to the inherently uncertain nature of litigation, the ultimate outcome or actual cost of settlement may vary materially from estimates. Refer to Note 29, Provisions.

5. Segment information

The Group has two businesses: Nokia's Networks business and Nokia Technologies, and four reportable segments for financial reporting purposes: (1) Ultra Broadband Networks, (2) Global Services and (3) IP Networks and Applications within Nokia's Networks business; and (4) Nokia Technologies. Segment-level information for Group Common and Other is also presented.

The Group has aggregated Mobile Networks and Fixed Networks operating segments to one reportable segment, Ultra Broadband Networks; and IP/Optical Networks and Nokia Software operating segments to one reportable segment, IP Networks and Applications. The aggregated operating segments have similar economic characteristics, such as long-term margins; have similar products, production processes, distribution methods and customers; and operate in a similar regulatory environment.

The President and CEO is the chief operating decision maker and monitors the operating results of operating and reportable segments for the purpose of making decisions about resource allocation and performance assessment. Key financial performance measures of the segments include primarily net sales and operating profit. The evaluation of segment performance and allocation of resources is based on segment operating profit(1).

Accounting policies of the segments are the same as those described in Note 2, Significant accounting policies. Inter-segment revenues and transfers are accounted for as if the revenues were to third parties, that is, at current market prices. Certain costs and revenue adjustments are not allocated to the segments(1).

Segment descriptions

Ultra Broadband Networks

Ultra Broadband Networks comprises Mobile Networks and Fixed Networks operating segments.

The Mobile Networks operating segment offers an industry-leading portfolio of end-to-end mobile networking solutions comprising hardware and software for communications service providers, enterprises and related markets/verticals, such as public safety and Internet of Things (IoT).

The Fixed Networks operating segment provides copper, fiber and cable access products, solutions and services. The portfolio allows for a customized combination of technologies that brings fiber to the most economical point for the customer.

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Global Services

Global Services operating segment provides a wide range of professional services with multi-vendor capabilities, covering network planning and optimization, systems integration as well as company-wide managed services. It also provides network implementation and care services for mobile networks, using the strength of its global service delivery for quality, speed and efficiency.

IP Networks and Applications

IP Networks and Applications comprises IP/Optical Networks and Nokia Software operating segments.

The IP/Optical Networks operating segment provides the key IP routing and optical transport systems, software and services to build high capacity network infrastructure for the internet and global connectivity.

The Nokia Software operating segment offers software solutions spanning customer experience management, network operations and management, communications and collaboration, policy and charging, as well as Cloud, IoT, security, and analytics platforms that enable digital services providers and enterprises to accelerate innovation, monetize services, and optimize their customer experience.

Nokia Technologies

The Nokia Technologies operating segment, building on decades of innovation and R&D leadership in technologies used in virtually all mobile devices used today, is expanding the Nokia patent licensing business, reintroducing the Nokia brand to smartphones through brand licensing, and establishing a technology licensing business. The majority of net sales and related costs and expenses attributable to licensing and patenting the separate patent portfolios of Nokia Technologies, Nokia's Networks business, and Nokia Bell Labs are recorded in Nokia Technologies. Each reportable segment continues to separately record its own research and development expenses.

Group Common and Other

Group Common and Other includes Alcatel-Lucent Submarine Networks and Radio Frequency Systems, both of which are being managed as separate entities. In addition, Group Common and Other includes Nokia Bell Labs' operating expenses, as well as certain corporate-level and centrally managed operating expenses.

(1) Segment results exclude costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

Segment information

Ultra Broadband Networks(1)	Global Services	IP Networks and Applications(2)	Nokia's Networks business Total	Nokia Technologies	Group Common and Other	Eliminations	Segment total	Unallocated items(3)
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o	8 691	5 710	5 719	20 120	1 486	974	–	22 580	(17)
o	1	–	–	1	15	47	(63)	–	–
on	(236)	(66)	(147)	(449)	(21)	(45)	–	(515)	(940)
s)	510	242	447	1 199	1 203	(222)	–	2 180	(2 239)
	12	–	–	12	–	–	–	12	–
o	8 970	5 810	5 743	20 523	1 639	1 060	–	23 222	(75)
o	–	–	–	–	15	54	(69)	–	–
on	(258)	(80)	(160)	(498)	(12)	(48)	–	(558)	(1 033)
s)	781	411	519	1 711	1 124	(248)	–	2 587	(2 571)
	21	–	–	21	(10)	–	–	11	–
o	9 757	6 036	6 036	21 829	1 038	1 105	–	23 972	(331)
o	1	–	–	1	15	37	(53)	–	–
on	(270)	(70)	(160)	(500)	(9)	(43)	–	(552)	(1 042)
s)	922	406	615	1 943	579	(350)	–	2 172	(3 272)
	18	–	–	18	–	–	–	18	–

- (1) Includes Mobile Networks net sales of EUR 6 712 million (EUR 6 895 million in 2017 and EUR 7 357 million in 2016) and Fixed Networks net sales of EUR 1 980 million (EUR 2 075 million in 2017 and EUR 2 401 million in 2016).
- (2) Includes IP Routing net sales of EUR 2 545 million (EUR 2 694 million in 2017 and EUR 2 941 million in 2016), Optical Networks net sales of EUR 1 606 million (EUR 1 499 million in 2017 and EUR 1 564 million in 2016) and Nokia Software net sales of EUR 1 568 million (EUR 1 550 million in 2017 and EUR 1 531 million in 2016).
- (3) Excludes costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

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Reconciliation of total segment operating profit to total operating profit/(loss)

EURm	2018	2017	2016
Total segment operating profit	2 180	2 587	2 172
Amortization and depreciation of acquired intangible assets and property, plant and equipment	(940)	(1 033)	(1 026)
Product portfolio strategy costs	(583)	(536)	(348)
Restructuring and associated charges	(321)	(579)	(774)
Transaction and related costs, including integration costs relating to the acquisition of Alcatel Lucent	(220)	(206)	(295)
Fair value changes of legacy IPR fund	(57)	–	–
Impairment of assets	(48)	(173)	–
Divestment of businesses	(39)	–	–
Release of acquisition-related fair value adjustments to deferred revenue and inventory	(16)	(55)	(840)
Other	(15)	11	11
Total operating (loss)/profit	(59)	16	(1 100)

Information by geographies

Net sales to external customers by region(1)

EURm	2018	2017	2016
Asia-Pacific	4 081	4 228	4 223
Europe	6 489	6 833	6 410
Greater China	2 165	2 516	2 654
Latin America	1 380	1 279	1 458
Middle East & Africa	1 874	1 907	1 872
North America	6 574	6 384	7 024
Total	22 563	23 147	23 641

(1) Net sales to external customers by region are based on the location of customer.

Net sales to external customers and non-current assets by country

EURm	Net sales(1)			Non-current assets(2)	
	2018	2017	2016	2018	2017
Finland(3)	1 556	1 698	1 138	1 462	1 437
United States	6 204	5 991	6 639	5 818	6 132
China	1 754	2 082	2 248	350	377
India	1 629	1 455	1 288	122	125
France	1 179	1 295	1 055	1 938	1 949
Other	10 241	10 626	11 273	905	1 052

Total 22 563 23 147 23 641 10 595 11 072

(1) Net sales to external customers by country are based on the location of customer.

(2) Consists of goodwill and other intangible assets and property, plant and equipment.

(3) All Nokia Technologies IPR and licensing net sales are allocated to Finland.

No single customer represents 10% or more of revenues.

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6. Acquisitions and disposals

Acquisitions

The Group completed the acquisitions of two businesses in 2018 and two businesses in 2017:

Company/business	Description
2018	
Unium Inc.	Unium Inc. is a United States-based software company that specializes in solving complex wireless networking problems for use in mission-critical and residential Wi-Fi applications. The Group acquired 100% ownership interest on March 15, 2018. Goodwill was allocated to Fixed Networks operating segment.
SpaceTime Insight Inc.	SpaceTime Insight Inc. is a United States-based software company that provides machine learning-powered analytics and IoT applications for some of the world's largest transportation, energy and utilities organizations. The Group acquired the business of SpaceTime Insight Inc. on April 30, 2018. Goodwill was allocated to Nokia Software operating segment.
2017	
Deepfield Networks Inc.	Deepfield Networks Inc. is a United States-based leader in real-time analytics for Internet Protocol (IP) network performance management and security. The Group acquired 100% ownership interest on January 31, 2017. Goodwill was allocated to IP/Optical Networks operating segment.
Comptel Corporation	Comptel Corporation is a Finland-based telecommunications software company. The Group acquired 88.4% of the share capital and voting rights as part of the tender offer on March 29, 2017. The Group acquired 100% ownership interest on June 29, 2017. Goodwill was allocated to Nokia Software operating segment.

Acquisitions completed by the Group in 2018 and 2017 are individually immaterial to the consolidated financial statements. Goodwill arising from these acquisitions is attributable to future derivations of the acquired technology, future customers, synergies and assembled workforce, and was allocated to groups of cash-generating units expected to benefit from the synergies of the combination. Refer to Note 17, Impairment. The majority of the goodwill acquired from these acquisitions is not expected to be deductible for tax purposes. The Group also recognized intangible assets from these acquisitions related to acquired customer relationships and technology assets. As of each respective acquisition date, the total consideration paid, aggregate fair values of intangible assets, other net assets acquired and resulting goodwill for the individually immaterial acquisitions are as follows:

EURm	2018	2017
Other intangible assets	–	169
Other net assets	(3)	67
Total identifiable net assets	(3)	236
Goodwill	32	162
Total purchase consideration	29	398

Disposals

In 2018, the gains and losses related to disposals recorded by the Group did not have a material effect on the Group's consolidated financial statements. In 2017, there were no disposals.

7. Discontinued operations

Discontinued operations include the continuing financial effects of the HERE business and the D&S business. The Group sold its HERE digital mapping and location services business to a German automotive industry consortium comprised of AUDI AG, BMW Group and Daimler AG in a transaction that was completed on December 4, 2015 (the sale of HERE business). The Group sold substantially all of its Devices & Services business to Microsoft in a transaction that was completed on April 25, 2014 (the sale of D&S business).

Results of Discontinued operations

EURm	2018	2017	2016
Net sales	–	–	–
Cost of sales	–	–	–
Gross profit	–	–	–
Research and development expenses	–	–	–
Selling, general and administrative expenses	(9)	(7)	(11)
Other income and expenses	17	(15)	(4)
Operating profit/(loss)	8	(22)	(15)
Financial income and expenses	81	6	14
Profit/(loss) before tax	89	(16)	(1)
Income tax benefit/(expense)	125	(10)	(28)
Profit/(loss) for the year, ordinary activities(1)	214	(26)	(29)
Gain on the sale, net of tax(2)	–	5	14
Profit/(loss) for the year	214	(21)	(15)

(1) In 2018, the results of discontinued operations mostly relate to a resolution reached in the tax dispute concerning the applicability of withholding tax in respect of payments by Nokia India Private Limited to Nokia Corporation for the supply of operating software in D&S business as well as a release of uncertain tax positions related to HERE business.

(2) In 2017, an additional gain on the sale of EUR 5 million was recognized related to the HERE business due to a tax indemnification. In 2016, an additional gain on the sale of EUR 7 million was recognized related to the HERE business as a result of the final settlement of the purchase price, and EUR 7 million related to the D&S business due to a tax indemnification.

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Cash flows from Discontinued operations

EURm	2018	2017	2016
Net cash used in operating activities	(33)	(14)	(10)
Net cash from/(used in) investing activities	10	(16)	3
Net cash flow for the period	(23)	(30)	(7)

8. Revenue recognition

The Group recognizes revenue from contracts with customers to reflect the transfer of promised goods and services to customers for amounts that reflect the consideration to which the Group expects to be entitled in exchange for those goods and services. In accordance with IFRS 15, the Group identifies only legally enforceable rights as contracts with customers. These contracts consist of any combination of hardware, services and intellectual property, and the associated revenue recognized for such contracts depends on the nature of the underlying goods and services provided, as described in Note 2, Significant accounting policies, and on the determination and allocation of the transaction price to the various performance obligations, as described in Note 4, Use of estimates and critical accounting judgments.

Disaggregation of revenue from contracts with customers

Management has determined that the Group's reported geographic areas depict how the nature, amount, timing and uncertainty of revenue and cash flows are affected by economic factors. Those geographic areas are reported in Note 5, Segment Information. The Group's primary customer base consists of companies that operate on a country specific or a regional basis and are subject to macroeconomic conditions specific to those geographic areas. Further, although the Group's technology cycle is similar around the world, each country or region is inherently in a different stage of that cycle, often influenced by macroeconomic conditions. As such, the prevailing macroeconomic conditions in each geographic area influence the purchasing decisions, including investments in new technologies, and the payment behavior of the Group's customer base.

Each reportable segment, as described in Note 5, Segment Information, consists of customers that operate in all geographic areas disclosed in the same note. No reportable segment has a specific revenue concentration in any geographic area other than Nokia Technologies, which is included within Europe.

Contract assets and contract liabilities

In accordance with the requirements of IFRS 15, the Group has presented its customer contracts in the consolidated statement of financial position as either a contract asset or a contract liability, depending on the relationship between the Group's performance and the customer's payment for each individual contract. On a net basis, a contract asset position represents where the Group has performed by transferring goods or services to a customer before the customer has provided the associated consideration or before payment is due. Conversely, a contract liability position represents where a customer has paid consideration or payment is due, but the Group has not yet transferred goods or services to the customer. Contract assets presented in the consolidated statement of financial position are current in nature while contract liabilities can be either current or non-current. Invoiced receivables represent unconditional rights to payment and are presented separately as Trade receivables in the consolidated statement of financial position.

The Group has recognized the following contract assets and liabilities:

EURm	As of December 31, 2018	As of January 1, 2018
Contract assets	1 875	1 919
Contract liabilities	3 496	3 694
Non-current	1 113	1 216
Current	2 383	2 478

Significant changes in both the contract asset and the contract liability balances shown above relate to the Group's routine execution of its contracts with customers. Specifically, the changes in contract assets relate to decreases as a result of balances that have been converted to trade receivables as the rights to payment have become unconditional, and the changes in contract liabilities relate to decreases as a result of balances that have been realized as revenue as the underlying performance obligations have been satisfied. These decreases were offset, or partially offset, by the addition of contract assets and contract liabilities recognized in the normal course of the Group's performance under its contracts with customers. There were no material cumulative adjustments to revenue recognized arising from changes in transaction prices, changes in measures of progress or changes in estimated variable consideration.

During the year, the Group has recognized EUR 1.7 billion of revenue that was included in the current contract liability balance at the beginning of the period.

Completed Contracts

In April 2014, the Group entered into an agreement to license certain technology patents and patent applications owned by the Group on the effective date of that agreement, on a non-exclusive basis, to a licensee, for a period of 10 years (the "License Agreement"). Contemporaneously and under the terms of the License Agreement, the Group issued to the licensee an option to extend the technology patent license for the remaining life of the licensed patents. The Group received all cash consideration due for the sale of the 10-year license and option upon closing of the License Agreement. Management has determined that, upon transition to IFRS 15, the License Agreement is a completed contract. As such, in accordance with the transition requirements of the standard, the Group continues to apply its prior revenue accounting policies, based on IAS 18, Revenue, and related interpretations, to the License Agreement. Under those policies, the Group is recognizing revenue over the term of the License Agreement.

As of December 31, 2018, the balance of deferred revenue related to the License Agreement of EUR 825 million, recognized in deferred revenue in the consolidated statement of financial position, is expected to be recognized as revenue through 2024.

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Order backlog

As of December 31, 2018, the aggregate amount of the transaction price allocated to partially or wholly unsatisfied performance obligations arising from fixed contractual commitments amounted to EUR 21.1 billion. Management estimates that approximately 59% of the unsatisfied performance obligations will be recognized as revenue during 2019, approximately 34% in 2020-2021 and the remainder thereafter. The estimated timing of the satisfaction of these performance obligations is subject to change owing to factors beyond the Group's control such as customer and network demand, market conditions and, in some cases, restrictions imposed by the weather or other factors impacting project logistics.

Revenue recognized in the reporting period from performance obligations satisfied (or partially satisfied) in previous periods (for example, due to changes in transaction price) was not material.

Additional disclosure for comparative purposes

The disclosure below is presented for comparative purposes, owing to the Group's adoption of IFRS 15 under the modified retrospective transition method. For the fiscal year 2018, the difference in the amount of revenue recorded by the application of IFRS 15 as compared to IAS 11, IAS 18 and related Interpretations that were in effect before the adoption of IFRS 15, was immaterial.

EURm	2018	2017	2016
Continuing operations			
Revenue from sale of products and licensing	14 003	14 216	14 543
Revenue from services(1)	7 980	8 150	8 166
Contract revenue recognized under percentage of completion accounting(2)	580	781	932
Total	22 563	23 147	23 641

(1) Excludes services performed as part of contracts under percentage of completion accounting.

(2) Contract revenue includes submarine projects, which account for the majority of the revenue.

9. Expenses by nature

EURm	2018	2017	2016
Continuing operations			
Personnel expenses (Note 10)	7 835	7 845	7 814
Cost of material	7 544	7 776	7 260
Depreciation and amortization (Notes 15, 16)	1 455	1 591	1 594
Rental expenses	338	339	344
Impairment charges	55	210	17
Other	5 685	5 733	7 829
Total operating expenses	22 912	23 494	24 858

Operating expenses include government grant income and R&D tax credits of EUR 124 million (EUR 140 million in 2017 and EUR 126 million in 2016) that have been recognized in the consolidated income statement as a deduction against research and development expenses.

10. Personnel expenses

EURm	2018	2017	2016
Continuing operations			
Salaries and wages	6 356	6 456	6 275
Share-based payment expense(1)	62	99	130
Pension and other post-employment benefit expense, net	465	445	458
Social security costs	952	845	951
Total	7 835	7 845	7 814

(1) Includes EUR 62 million for equity-settled awards (EUR 97 million in 2017 and EUR 119 million in 2016).

The average number of employees is 103 083 (101 731 in 2017 and 102 687 in 2016).

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11. Other income and expenses

EURm	2018	2017	2016
Continuing operations			
Other income			
Gains from unlisted venture funds(1)	162	51	13
Pension curtailment and plan amendment income	23	38	5
Profit on sale of property, plant and equipment	21	19	–
Subsidies and government grants	8	2	11
Foreign exchange gain on hedging forecasted sales and purchases, net	–	93	–
Interest income from customer receivables and overdue payments(2)	–	25	29
Expiration of stock option liability	–	18	–
VAT and other indirect tax refunds and social security credits	–	–	19
Other	76	117	40
Total	290	363	117
Other expenses			
Restructuring, cost reduction and associated charges	(266)	(568)	(759)
Losses and expenses related to unlisted venture funds(1)	(118)	(6)	(4)
Pension curtailment and plan amendment expenses	(79)	(41)	(7)
Impairment charges	(55)	(210)	(17)
Loss on sale of property, plant and equipment	(52)	(23)	(3)
Impairment losses on trade receivables	(45)	(24)	(116)
Foreign exchange loss on hedging forecasted sales and purchases, net	(27)	–	(54)
VAT and other indirect tax refunds and other provisions	(13)	–	1
Expenses related to sale of receivables transactions(3)	–	(37)	(42)
Other	(57)	(46)	24
Total	(712)	(955)	(977)

(1) All venture fund related gains and losses are presented in other income and expenses as a result of the adoption of IFRS 9 in the beginning of 2018. In 2017 and 2016 gains and losses for certain venture funds were presented in financial income and expenses.

(2) As a result of the adoption of IFRS 15 in the beginning of 2018, interest income associated with customer receivables and overdue payments are presented in financial income and expenses in 2018. Refer to Note 12, Financial income and expenses.

(3) As a result of the adoption of IFRS 15 in the beginning of 2018, expenses related to sale of receivables transactions are presented in financial income and expenses in 2018. Refer to Note 12, Financial income and expenses.

12. Financial income and expenses

EURm	2018	2017	2016
Continuing operations			
Interest income on financial investments at fair value through profit and loss	–	–	19
	39	35	65

Interest income on other financial investments not measured at fair value through profit and loss			
Interest income on financing components of other contracts(1)	37	–	–
Net interest expense on derivatives not under hedge accounting	–	–	(18)
Interest expense on bonds and loans payable(2)(3)	(105)	(391)	(234)
Interest expense on financing components of other contracts(3)(4)	(162)	(81)	–
Net interest expense on defined benefit plans (Note 27)	(15)	(37)	(65)
Net realized (losses)/gains on investments at fair value through other comprehensive income(5)	–	(33)	15
Net fair value losses on investments at fair value through profit and loss	(1)	–	(18)
Net gains on other derivatives designated at fair value through profit and loss	–	–	21
Net fair value gains on hedged items under fair value hedge accounting	(7)	42	11
Net fair value losses on hedging instruments under fair value hedge accounting	9	(23)	(15)
Net foreign exchange losses	(100)	(157)	(9)
Other financial income(6)	9	172	85
Other financial expenses(7)	(17)	(64)	(144)
Total	(313)	(537)	(287)

(1) In 2018 interest income associated with customer receivables and overdue payments is presented in financial income and expenses as a result of the adoption of IFRS 15 in the beginning of 2018.

(2) In 2017, interest expense includes one-time charges of EUR 220 million related to the Group's tender offer to purchase USD 300 million 6.50% notes due January 2028, USD 1 360 million 6.45% notes due March 2029, EUR 500 million 6.75% notes due February 2019 and USD 1 000 million 5.375% notes due May 2019. In 2016, interest expense included one-time charges of EUR 41 million, primarily related to the redemption of Nokia of America Corporation USD 650 million 4.625% notes due July 2017, USD 500 million 8.875% notes due January 2020 and USD 700 million 6.750% notes due November 2020.

(3) An Interest expense of EUR 472 million presented within "Interest expense on financial liabilities carried at amortized cost" in 2017 has been recategorized into EUR 391 million presented within "Interest expense on bonds and loans payable" and EUR 81 million presented within "Interest expense on financing components of other contracts."

(4) In 2018, includes interest expenses associated with the inclusion of new items such as costs of EUR 66 million related to the sale of receivables and expenses of EUR 58 million for financing components from customer and other contracts as a result of the adoption of new IFRS standards in the beginning of 2018. In 2017, includes an interest expense of EUR 69 million related to a change in uncertain tax positions.

(5) In 2017, includes a one-time charge of EUR 32 million related to the sale of certain financial assets.

(6) Venture fund related gains and losses are presented in other income and expenses as a result of the adoption of IFRS 9 in the beginning of 2018. In 2017, includes distributions of EUR 80 million (EUR 66 million in 2016) from private venture funds held as non-current available-for-sale investments as well as income of EUR 64 million due to a change in the fair value of the financial liability related to Nokia Shanghai Bell. Refer to Note 33, Significant partly-owned subsidiaries.

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(7) Venture fund related gains and losses are presented in other income and expenses as a result of the adoption of IFRS 9 in the beginning of 2018. In 2017, includes impairments of EUR 34 million (EUR 108 million in 2016) related to private venture funds held as non-current available-for-sale investments. Refer to Note 17, Impairment.

13. Income taxes

Components of the income tax (expense)/benefit

EURm	2018	2017	2016
Continuing operations			
Current tax	(530)	(261)	(534)
Deferred tax	341	(666)	991
Total	(189)	(927)	457

Income tax reconciliation

Reconciliation of the difference between income tax computed at the statutory rate in Finland of 20% and income tax recognized in the consolidated income statement:

EURm	2018	2017	2016
Income tax benefit at statutory rate	72	102	274
Permanent differences	(22)	85	31
Tax impact on operating model changes(1)	13	(245)	439
Non-creditable withholding taxes	(24)	(29)	(42)
Income taxes for prior years(2)	26	(132)	3
Effect of different tax rates of subsidiaries operating in other jurisdictions	(31)	178	88
Effect of deferred tax assets not recognized(3)	(205)	(164)	(318)
Benefit arising from previously unrecognized deferred tax assets	46	56	19
Net increase in uncertain tax positions	(43)	–	(20)
Change in income tax rates(4)	(45)	(738)	3
Income taxes on undistributed earnings	26	(42)	(23)
Other	(2)	2	3
Total	(189)	(927)	457

(1) In 2017, the Group continued to integrate former Nokia and Alcatel Lucent operating models, the Group transferred certain intellectual property between its operations in Finland and in the United States, recording a tax expense of EUR 245 million. These transactions reduced the deferred tax assets in the United States and increased the deferred tax assets in Finland. In 2016, following the completion of the Squeeze-Out of the remaining Alcatel Lucent Securities, the Group launched actions to integrate the former Alcatel Lucent and Nokia operating models. In connection with these integration activities, the Group transferred certain intellectual property to its operations in the United States, recording a tax benefit and additional deferred tax assets of EUR 348 million. In addition, the Group elected to treat the acquisition of Alcatel Lucent's operations in the United States as an asset purchase for United States tax purposes. The impact of this election was to utilize or forfeit existing deferred tax assets and

record new deferred tax assets with a longer amortization period than the life of those forfeited assets. As a result of this, EUR 91 million additional deferred tax assets were recorded in 2016.

- (2) In 2017, the Group recorded a EUR 139 million tax expense related to an uncertain tax position in Germany. The matter relates to the disposal of the former Alcatel Lucent railway signaling business in 2006 to Thalès.
- (3) In 2018, relates primarily to foreign withholding tax credits in Finland. In 2016, relates primarily to tax losses and temporary differences in France.
- (4) In 2017, primarily resulting from the tax rate change in the United States. The United States federal income tax rate reduction caused a revaluation of the United States deferred tax assets and liabilities, resulting in the recognition of an additional tax provision of EUR 777 million.

Income tax liabilities and assets include a net EUR 177 million liability (EUR 344 million in 2017) relating to uncertain tax positions with inherently uncertain timing of cash outflows. Net decrease in uncertain tax positions primarily relates to Discontinued Operations, refer to Note 7, Discontinued operations.

Prior period income tax returns for certain Group companies are under examination by local tax authorities. The Group has on-going tax audits in various jurisdictions, including Canada, India, Saudi Arabia and South Korea. The Group's business and investments, especially in emerging market countries, may be subject to uncertainties, including unfavorable or unpredictable tax treatment. Management judgment and a degree of estimation are required in determining the tax expense or benefit. Even though management does not expect that any significant additional taxes in excess of those already provided for will arise as a result of these examinations, the outcome or actual cost of settlement may vary materially from estimates.

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Deferred tax assets and liabilities

EURm	2018 Deferred tax assets	Deferred tax liabilities	Net balance	2017 Deferred tax assets	Deferred tax liabilities	Net balance
Tax losses carried forward and unused tax credits	1 300	–		1 019	–	
Undistributed earnings	–	(80)		–	(106)	
Intangible assets and property, plant and equipment	2 922	(299)		2 851	(353)	
Defined benefit pension assets	51	(1 028)		13	(940)	
Other non-current assets	28	(21)		85	(6)	
Inventories	196	(16)		157	(1)	
Other current assets	178	(16)		241	(7)	
Defined benefit pension and other post-retirement liabilities	962	–		933	(60)	
Other non-current liabilities	30	(10)		34	–	
Provisions	205	(47)		240	(55)	
Other current liabilities	220	(84)		223	(78)	
Other temporary differences	77	(7)		12	(33)	
Total before netting	6 169	(1 608)	4 561	5 808	(1 639)	4 169
Netting of deferred tax assets and liabilities	(1 258)	1 258	–	(1 226)	1 226	–
Total after netting	4 911	(350)	4 561	4 582	(413)	4 169

Movements in the net deferred tax balance during the year:

EURm	2018	2017
As of January 1	4 169	5 298
Adoption of IFRS 9 and IFRS 15	19	–
Recognized in income statement, Continuing Operations	341	(666)
Recognized in income statement, Discontinued Operations	29	2
Recognized in other comprehensive income	(57)	(150)
Recognized in equity	6	(7)
Acquisitions through business combinations and disposals	–	(29)
Translation differences	54	(279)
As of December 31	4 561	4 169

Amount of temporary differences, tax losses carried forward and tax credits for which no deferred tax asset was recognized due to uncertainty of utilization:

EURm	2018	2017
Temporary differences	1 600	1 879
Tax losses carried forward	18 757	18 449
Tax credits	108	37
Total	20 465	20 365

The majority of the unrecognized temporary differences and tax losses relate to France. Based on the pattern of losses in the past years and in the absence of convincing other evidence of sufficient taxable profit in the future years, it is uncertain whether these deferred tax assets can be utilized in the foreseeable future. A significant portion of the French unrecognized deferred tax assets are indefinite in nature and available against future French tax liabilities, subject to a limitation of 50% of annual taxable profits.

Deferred tax assets are recognized to the extent it is probable that future taxable profit will be available against which the unused tax losses, unused tax credits and deductible temporary differences can be utilized in the relevant jurisdictions. The majority of the Group's recognized deferred tax assets relate to unused tax losses, tax credits and deductible temporary differences in Finland of EUR 2.5 billion (EUR 2.5 billion in 2017) and the United States of EUR 1.2 billion (EUR 1.0 billion in 2017). Based on the recent years' profitability in Finland and the United States, excluding certain integration costs in Finland related to the acquisition of Alcatel Lucent in 2016, and the latest forecasts of future financial performance, the Group has been able to establish a pattern of sufficient tax profitability in Finland and the United States to conclude that it is probable that the Group will be able to utilize the tax losses, tax credits and deductible temporary differences in the foreseeable future.

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Expiry of tax losses carried forward and unused tax credits:

EURm	2018			2017		
	Recognized	Unrecognized	Total	Recognized	Unrecognized	Total
Tax losses carried forward						
Within 10 years	2 195	1 698	3 893	1 338	1 491	2 828
Thereafter	353	58	411	135	25	160
No expiry	1 497	17 001	18 498	1 674	16 933	18 608
Total	4 045	18 757	22 802	3 147	18 449	21 596
Tax credits						
Within 10 years	249	92	341	367	21	388
Thereafter	204	5	209	111	5	116
No expiry	11	11	22	35	11	46
Total	464	108	572	513	37	550

The Group has undistributed earnings of EUR 709 million (EUR 1 578 million in 2017) for which a deferred tax liability has not been recognized as these earnings will not be distributed in the foreseeable future.

14. Earnings per share

	2018 EURm	2017 EURm	2016 EURm
Basic			
Profit or loss attributable to equity holders of the parent			
Continuing operations	(554)	(1 473)	(751)
Discontinued operations	214	(21)	(15)
Loss for the year	(340)	(1 494)	(766)
Diluted			
Effect of profit or loss adjustments			
Adjustment relating to Alcatel Lucent American Depositary Shares	–	–	(8)
Total effect of profit or loss adjustments	–	–	(8)
Profit or loss attributable to equity holders of the parent adjusted for the effect of dilution			
Continuing operations	(554)	(1 473)	(759)
Discontinued operations	214	(21)	(15)
Loss for the year	(340)	(1 494)	(774)
	000s shares	000s shares	000s shares
Basic			
Weighted average number of shares in issue	5 588 020	5 651 814	5 732 371
Diluted			
Effect of dilutive shares			
Effect of dilutive equity-settled share-based incentive programs			
Restricted shares and other	3 656	–	–
Performance shares	20 577	–	–
Stock options	224	–	–
Total effect of dilutive equity-settled share-based incentive programs	24 457	–	–
Effect of other dilutive shares			

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Alcatel Lucent American Depositary Shares	–	–	8 746
Total effect of other dilutive-shares	–	–	8 746
Total effect of dilutive shares	24 457	–	8 746
Adjusted weighted average number of shares	5 612 477	5 651 814	5 741 117
Earnings per share attributable to equity holders of the parent	EUR	EUR	EUR
Basic earnings per share			
Continuing operations	(0.10)	(0.26)	(0.13)
Discontinued operations	0.04	0.00	0.00
Loss for the year	(0.06)	(0.26)	(0.13)
Diluted earnings per share			
Continuing operations	(0.10)	(0.26)	(0.13)
Discontinued operations	0.04	0.00	0.00
Loss for the year	(0.06)	(0.26)	(0.13)

Basic earnings per share is calculated by dividing the profit or loss attributable to equity holders of the parent by the weighted average number of shares outstanding (does not include treasury shares) during the year. Diluted earnings per share is calculated by adjusting the profit or loss attributable to equity holders of the parent, and the weighted average number of shares outstanding, for the effects of all dilutive potential ordinary shares.

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4 million restricted shares are outstanding (5 million in 2017 and 2016) that could potentially have a dilutive impact in the future but are excluded from the calculation as they are determined to be anti-dilutive.

21 million performance shares are outstanding (14 million in 2017 and 10 million in 2016) that could potentially have a dilutive impact in the future but are excluded from the calculation as they are determined to be anti-dilutive.

Stock options equivalent to fewer than 1 million shares (fewer than 1 million shares in 2017 and 2016) have been excluded from the calculation of diluted shares as they are determined to be anti-dilutive.

In 2016, the Group acquired 107 775 949 Alcatel Lucent shares from JPMorgan Chase Bank N.A., as depository, pursuant to the share purchase agreement announced on March 17, 2016. These shares represent Alcatel Lucent shares that remained in the Alcatel Lucent American Depositary Receipts program after the cancellation period and following the program's termination on April 25, 2016. On May 10, 2016 the Group registered with the Finnish Trade Register 59 276 772 new Nokia shares issued to the Alcatel depository in settlement of the transaction. 9 million potential shares have been included in the calculation of diluted shares from March 16, 2016 to reflect the part-year effect of these shares, and were included in the calculation as dilutive shares until the registration date.

15. Intangible assets

EURm	Goodwill	Other	Total
Acquisition cost as of January 1, 2017	6 632	9 382	16 014
Translation differences	(497)	(521)	(1 018)
Additions	–	40	40
Acquisitions through business combinations	162	169	331
Disposals and retirements	–	(73)	(73)
Acquisition cost as of December 31, 2017	6 297	8 997	15 294
Accumulated amortization and impairment charges as of January 1, 2017	(908)	(4 146)	(5 054)
Translation differences	–	131	131
Impairment charges	(141)	(33)	(174)
Disposals and retirements	–	72	72
Amortization	–	(1 050)	(1 050)
Accumulated amortization and impairment charges as of December 31, 2017	(1 049)	(5 026)	(6 075)
Net book value as of January 1, 2017	5 724	5 236	10 960
Net book value as of December 31, 2017	5 248	3 971	9 219
Acquisition cost as of January 1, 2018	6 297	8 997	15 294
Translation differences	172	175	347
Additions	–	277	277
Acquisitions through business combinations	32	–	32
Disposals and retirements(1)	(141)	(25)	(166)
Acquisition cost as of December 31, 2018	6 360	9 424	15 784
Accumulated amortization and impairment charges as of January 1, 2018	(1 049)	(5 026)	(6 075)
Translation differences	–	(80)	(80)
Impairment charges	–	(16)	(16)
Disposals and retirements(1)	141	15	156
Amortization	–	(964)	(964)
Accumulated amortization and impairment charges as of December 31, 2018	(908)	(6 071)	(6 979)
Net book value as of January 1, 2018	5 248	3 971	9 219
Net book value as of December 31, 2018	5 452	3 353	8 805

- (1) Includes goodwill with acquisition cost and accumulated impairment of EUR 141 million related to the Digital Health business disposal in 2018.

Net book value of other intangible assets by type of asset:

EURm	2018	2017
Customer relationships	2 063	2 306
Technologies	582	1 107
Tradenames and trademarks	191	233
Other	517	325
Total	3 353	3 971

The remaining amortization periods are approximately two to eight years for customer relationships, one to four years for developed technology, one to five years for tradenames and trademarks and one to ten years for other.

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16. Property, plant and equipment

EURm	Buildings and constructions	Machinery and equipment	Other	Assets under construction	Total
Acquisition cost as of January 1, 2017	999	2 693	114	89	3 895
Translation differences	(52)	(105)	(9)	(5)	(171)
Additions	115	370	3	89	577
Acquisitions through business combinations	1	1	–	–	2
Reclassifications	42	43	–	(85)	–
Disposals and retirements	(40)	(353)	(2)	(2)	(397)
Acquisition cost as of December 31, 2017	1 065	2 649	106	86	3 906
Accumulated depreciation as of January 1, 2017	(216)	(1 685)	(13)	–	(1 914)
Translation differences	20	67	1	–	88
Impairment charges	–	(25)	–	–	(25)
Disposals and retirements	22	315	2	–	339
Depreciation	(97)	(440)	(4)	–	(541)
Accumulated depreciation as of December 31, 2017	(271)	(1 768)	(14)	–	(2 053)
Net book value as of January 1, 2017	783	1 008	101	89	1 981
Net book value at December 31, 2017	794	881	92	86	1 853
Acquisition cost as of January 1, 2018	1 065	2 649	106	86	3 906
Translation differences	8	6	2	–	16
Additions	65	366	–	88	519
Reclassifications	31	49	–	(80)	–
Disposals and retirements	(25)	(237)	(3)	(3)	(268)
Acquisition cost as of December 31, 2018	1 144	2 833	105	91	4 173
Accumulated depreciation as of January 1, 2018	(271)	(1 768)	(14)	–	(2 053)
Translation differences	(5)	(5)	–	–	(10)
Impairment charges	(33)	(7)	–	–	(40)
Disposals and retirements	15	194	2	–	211
Depreciation	(92)	(397)	(2)	–	(491)
Accumulated depreciation as of December 31, 2018	(386)	(1 983)	(14)	–	(2 383)
Net book value as of January 1, 2018	794	881	92	86	1 853
Net book value as of December 31, 2018	758	850	91	91	1 790

In 2014, the tax authorities in India placed a lien which prohibited the Group from transferring the mobile devices-related facility in Chennai to Microsoft as part of the sale of D&S business.

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17. Impairment

Goodwill

The Group has allocated goodwill to the operating segments within Nokia's Networks business corresponding to groups of cash generating units (CGUs) in line with the Group's operational and reporting structure (refer to Note 5, Segment information).

Allocation of goodwill

The following table presents the allocation of goodwill to groups of CGUs as of the annual impairment testing date October 1:

EURm	2018	2017
Mobile Networks	963	950
Fixed Networks	836	812
Global Services	1 306	1 288
IP/Optical Networks	1 871	1 847
Nokia Software	434	405

Recoverable amounts

The recoverable amounts of the groups of CGUs were based on fair value less costs of disposal that was determined using a level 3 fair value measurement based on a discounted cash flow calculation. The cash flow projections used in calculating the recoverable amounts were based on financial plans approved by management covering an explicit forecast period of three years.

Seven additional years of cash flow projections subsequent to the explicit forecast period reflect a gradual progression towards the steady state cash flow projections modelled in the terminal year. The terminal growth rate assumptions reflect long-term average growth rates for the industries and economies in which the groups of CGUs operate. The discount rates reflect current assessments of the time value of money and relevant market risk premiums reflecting risks and uncertainties for which the future cash flow estimates have not been adjusted. Other key variables in future cash flow projections include assumptions on estimated sales growth, gross margin and operating margin. All cash flow projections are consistent with market participant assumptions.

The results of the impairment testing indicate adequate headroom for each group of CGUs. The key assumptions applied in the impairment testing analysis for the groups of CGUs as of the annual impairment testing date October 1:

	2018	2017	2018	2017
Key assumption %	Terminal	Terminal	Post-tax	Post-tax
	growth rate	growth rate	discount rate	discount rate
Mobile Networks	1.1	1.1	9.2	8.9
Fixed Networks	1.1	1.1	7.9	8.6
Global Services	1.0	1.0	8.6	8.9
IP/Optical Networks	1.3	1.3	9.1	9.3
Nokia Software	1.6	1.7	8.7	8.2

Impairment charges by asset category

EURm	2018	2017	2016
Goodwill	–	141	–
Other intangible assets	16	33	9
Property, plant and equipment	39	25	–
Available-for-sale investments	–	45	116
Total	55	244	125

Intangible assets and property, plant and equipment

In 2017, as a result of challenging business conditions, the Group recorded an impairment charge of EUR 141 million on its Digital Health CGU. The impairment charge was allocated in its entirety to reduce the goodwill carrying amount of the Digital Health CGU to zero.

Other impairments recorded by the Group in 2018, 2017 and 2016 are immaterial.

Available-for-sale investments

In 2017 and 2016 the Group recognized an impairment charge of EUR 45 million and EUR 116 million, respectively, primarily related to the performance of certain private funds investing in IPR that were included in non-current available-for-sale equity investments at cost less impairment. These charges were recorded in other expenses and financial income and expenses. As a result of the adoption of IFRS 9 on January 1, 2018, venture fund investments are classified at fair value through profit and loss and the related gains and losses are presented in other income and expenses.

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18. Inventories

EURm	2018	2017
Raw materials, supplies and other	462	271
Work in progress	1 398	1 166
Finished goods	1 308	1 209
Total	3 168	2 646

The cost of inventories recognized as an expense during the year and included in the cost of sales is EUR 7 569 million (EUR 7 803 million in 2017 and EUR 7 636 million in 2016).

Movements in allowances for excess and obsolete inventory for the years ended December 31:

EURm	2018	2017	2016
As of January 1	432	456	195
Charged to income statement	153	100	354
Deductions(1)	(64)	(124)	(93)
As of December 31	521	432	456

(1) Deductions include utilization and releases of allowances.

19. Prepaid expenses and accrued income

Non-current

EURm	2018	2017
R&D tax credits and other indirect tax receivables	155	174
Deposits	56	77
Other	97	117
Total	308	368

Current

EURm	2018	2017
Social security, R&D tax credits, VAT and other indirect taxes	514	552
Divestment-related receivables	67	79
Deposits	35	28
Accrued revenue(1)	–	232
Other	408	368
Total	1 024	1 259

(1) As a result of the adoption of IFRS 15 in the beginning of 2018, accrued revenue is presented within contract assets. Refer to Note 3, New and amended standards and interpretations and Note 8, Revenue recognition.

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20. Shares of the Parent Company

Shares and share capital

Nokia Corporation (Parent Company) has one class of shares. Each share entitles the holder to one vote at General Meetings. As of December 31, 2018, the share capital of Nokia Corporation is EUR 245 896 461.96 and the total number of shares issued is 5 635 945 159. As of December 31, 2018, the total number of shares includes 42 782 966 shares owned by Group companies representing 0.8% of share capital and total voting rights. Under the Nokia Articles of Association, Nokia Corporation does not have minimum or maximum share capital or share par value.

On February 2, 2018, the Parent Company cancelled 207 897 644 shares.

Authorizations

Authorization to issue shares and special rights entitling to shares

At the Extraordinary General Meeting held on December 2, 2015, the shareholders authorized the Board of Directors to issue, in deviation from the shareholders' pre-emptive right, a maximum of 2 100 million shares through one or more share issues. The authorization includes the right for the Board of Directors to resolve on all the terms and conditions of such share issuances. The authorization may be used to issue Parent Company shares to the holders of Alcatel Lucent shares, American Depositary Shares and convertible bonds as well as to beneficiaries of Alcatel Lucent employee equity compensation arrangements for the purpose of implementing the transaction with Alcatel Lucent, including the consummation of the public exchange offers made to Alcatel Lucent shareholders as well as other transactions contemplated by the memorandum of understanding between the Group and Alcatel Lucent, and/or otherwise to effect the combination. The authorization is effective until December 2, 2020.

At the Annual General Meeting held on May 23, 2017, the shareholders authorized the Board of Directors to issue a maximum of 560 million shares through one or more issues of shares or special rights entitling to shares. The Board of Directors was authorized to issue either new shares or shares held by the Parent Company. The authorization included the right for the Board of Directors to resolve on all the terms and conditions of such share and special rights issuances, including issuance in deviation from the shareholders' pre-emptive rights. The authorization may be used to develop the Parent Company's capital structure, diversify the shareholder base, finance or carry out acquisitions or other arrangements, settle the Parent Company's equity-based incentive plans, or for other purposes resolved by the Board of Directors. The authorization that would have been effective until November 23, 2018 was terminated by a resolution of Annual General Meeting on May 30, 2018.

At the Annual General Meeting held on May 30, 2018, the shareholders authorized the Board of Directors to issue a maximum of 550 million shares through one or more issues of shares or special rights entitling to shares. The Board of Directors is authorized to issue either new shares or shares held by the Parent Company. The authorization included the right for the Board of Directors to resolve on all the terms and conditions of such share and special rights issuances, including issuance in deviation from the shareholders' pre-emptive rights. The authorization may be used to develop the Parent Company's capital structure, diversify the shareholder base, finance or carry out acquisitions or other arrangements, settle the Parent Company's equity-based incentive plans, or for other purposes resolved by the Board of Directors. The authorization is effective until November 30, 2019.

In 2018, under the authorization held by the Board of Directors, the Parent Company issued 424 500 new shares following the holders of stock options issued in 2012 and 2013 exercising their option rights.

In 2018, the Parent Company issued 4 014 000 new shares without consideration to the Parent Company to fulfil the company's obligation under the Nokia Equity Programs.

In 2018, under the authorization held by the Board of Directors, the Parent Company issued 13 220 987 treasury shares to employees, including certain members of the Group Leadership Team, as settlement under equity-based incentive plans and the employee share purchase plan. The shares were issued without consideration and in accordance with the plan rules.

As of December 31, 2018, the Board of Directors had no other authorizations to issue shares, convertible bonds, warrants or stock options.

Other authorizations

At the Annual General Meeting held on May 23, 2017, the shareholders authorized the Board of Directors to repurchase a maximum of 560 million shares. The amount corresponds to less than 10% of the total number of Parent Company's shares. The shares may be repurchased in order to optimize the capital structure of the Company. In addition, shares may be repurchased in order to meet obligations arising from debt financial instruments that are exchangeable into equity instruments, to settle equity-based incentive plans for employees of the Group or of its associated companies, or to be transferred for other purposes such as financing or carrying out acquisitions. The authorization that would have been effective until November 23, 2018 was terminated by a resolution of the Annual General Meeting on May 30, 2018.

At the Annual General Meeting held on May 30, 2018, the shareholders authorized the Board of Directors to repurchase a maximum of 550 million shares. The amount corresponds to less than 10% of the total number of Parent Company's shares. The shares may be repurchased in order to optimize the capital structure of the Company. In addition, shares may be repurchased in order to meet obligations arising from debt financial instruments that are exchangeable into equity instruments, to settle equity-based incentive plans for employees of the Group or of its associated companies, or to be transferred for other purposes such as financing or carrying out acquisitions. The authorization is effective until November 30, 2019.

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21. Translation differences, fair value and other reserves

EURm	Translation differences	Pension remeasurements	Hedging reserve	Cost of hedging reserve	Fair value reserve
As of January 1, 2016	292	(172)	(2)	–	378
Foreign exchange translation differences	265	–	–	–	–
Net investment hedging losses	(83)	–	–	–	–
Remeasurements of defined benefit plans	–	343	–	–	–
Net fair value losses	–	–	(13)	–	(10)
Transfer to income statement	(14)	–	25	–	(63)
Acquisition on non-controlling interest	(15)	(2)	–	–	–
Movement attributable to non-controlling interests	38	4	–	–	–
As of December 31, 2016	483	173	10	–	305
Foreign exchange translation differences	(1 830)	–	–	–	–
Net investment hedging gains	352	–	–	–	–
Remeasurements of defined benefit plans	–	662	–	–	–
Net fair value gains	–	–	103	–	18
Transfer to income statement	12	–	(75)	–	(104)
Other increase/(decrease)	1	3	(1)	–	–
Movement attributable to non-controlling interests	50	–	–	–	–
As of December 31, 2017	(932)	838	37	–	219
Adoption of IFRS 9	–	–	–	(10)	(242)
As of January 1, 2018	(932)	838	37	(10)	(23)
Foreign exchange translation differences	444	–	–	–	–
Net investment hedging losses	(66)	–	–	3	–
Remeasurements of defined benefit plans	–	293	–	–	–
Net fair value losses	–	–	(28)	(8)	(116)
Transfer to income statement	(37)	–	(30)	23	78
Other (decrease)/increase	(1)	6	–	–	–
As of December 31, 2018	(592)	1 137	(21)	8	(61)

Translation differences consist of foreign exchange differences arising from translation of foreign Group companies' assets and liabilities into euro, the presentation currency of the consolidated financial statements, as well as gains and losses related to hedging of net investments in foreign operations. On disposal or abandonment of all or a part of a foreign Group company, the cumulative amount of translation differences and related accumulated changes in fair value of qualifying net investment hedges are recognized as income or expense in the consolidated income statement when the gain or loss on disposal is recognized or when the abandonment occurs. Refer to Note 2, Significant accounting policies.

Pension remeasurements reserve includes actuarial gains and losses as well as return on plan assets and changes in the effect of the asset ceiling, excluding amounts recognized in net interest, related to the Group's defined benefit plans. Refer to Note 2, Significant accounting policies and Note 27, Pensions and other post-employment benefits.

Hedging reserve includes the change in fair value that reflects the change in spot exchange rates for certain foreign exchange forward contracts that are designated as cash flow hedges to the extent that the hedge is effective. The accumulated gain or loss in the hedging reserve for each hedge is recycled to other income and expenses in the consolidated income statement when the revenue or expense related to the hedged item is recognized. Refer to Note 2, Significant accounting policies.

Cost of hedging reserve includes forward element of foreign exchange forward contracts and time value of foreign exchange options related to cash flow hedging of forecasted foreign currency sale and purchase transactions. Additionally, cost of hedging reserve includes the difference between the change in fair value of forward element of foreign exchange forward contracts and time value of option contracts and the amortization of forward element of foreign exchange forward contracts and time value of option contracts related to net investment hedging. Cost of hedging reserve also includes changes in fair value from foreign currency basis spread related to fair value hedging of foreign currency denominated bonds. The accumulated gain or loss in the cost of hedging reserve for each hedge is recycled to other income and expenses in the consolidated income statement when the revenue related to the hedged item is recognized. Cost of hedging reserve is a new component of equity introduced as a result of the adoption of IFRS 9 in 2018. Refer to Note 2, Significant accounting policies and Note 3, New and amended standards and interpretations.

In 2018, fair value reserve includes the changes in fair value of financial instruments that are managed in a portfolio with a business model of holding investments to collect contractual cash flows including principal and interest as well as selling investments. These financial instruments include certain current financial investments, customer or vendor related loan receivables and trade receivables. The fair values of these instruments are reduced by amounts of loss allowances. Upon derecognition of the underlying financial instrument the related cumulative gain or loss is recognized in financial income and expenses in the consolidated income statement. In 2017 and 2016 fair value reserve included changes in the fair value of available-for-sale investments. Refer to Note 2, Significant accounting policies and Note 3, New and amended standards and interpretations.

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22. Other comprehensive income

EURm	2018			2017			2016		
	Gross	Tax	Net	Gross	Tax	Net	Gross	Tax	Net
Pension remeasurements									
Remeasurements of defined benefit plans	388	(90)	298	723	(58)	665	613	(269)	344
Net change during the year	388	(90)	298	723	(58)	665	613	(269)	344
Translation differences									
Exchange differences on translating foreign operations	443	1	444	(1 831)	1	(830)	265	–	265
Transfer to income statement	(42)	–	(42)	12	–	12	(14)	–	(14)
Net change during the year	401	1	402	(1 819)	1	818)	251	–	251
Net investment hedges									
Net investment hedging (losses)/gains	(79)	16	(63)	440	(88)	352	(103)	20	(83)
Transfer to income statement	6	(1)	5	–	–	–	–	–	–
Net change during the year	(73)	15	(58)	440	(88)	352	(103)	20	(83)
Cash flow and other hedges									
Net fair value (losses)/gains	(44)	8	(36)	129	(26)	103	(16)	3	(13)
Transfer to income statement	(9)	2	(7)	(94)	19	(75)	30	(5)	25
Net change during the year	(53)	10	(43)	35	(7)	28	14	(2)	12
Financial assets at fair value through other comprehensive income(1)									
Net fair value (losses)/gains	(144)	28	(116)	–	–	–	–	–	–
Transfer to income statement on impairment	33	(8)	25	–	–	–	–	–	–
Transfer to income statement on disposal	66	(13)	53	–	–	–	–	–	–
Net change during the year	(45)	7	(38)	–	–	–	–	–	–
Available-for-sale investments(1)									
Net fair value gains/(losses)	–	–	–	19	(1)	18	(9)	(1)	(10)
Transfer to income statement on impairment	–	–	–	14	(1)	13	25	(4)	21
Transfer to income statement on disposal	–	–	–	(121)	4	(117)	(91)	7	(84)
Net change during the year	–	–	–	(88)	2	(86)	(75)	2	(73)
Other increase/(decrease), net	1	–	1	(1)	–	(1)	(6)	–	(6)
Total	619	(57)	562	(710)	(150)	(860)	694	(249)	445

(1) Related to the adoption of IFRS 9, investments in unlisted private equity shares, technology-related publicly quoted shares and unlisted venture funds that were classified as available-for-sale investments are classified as fair value through profit and loss. Certain current financial investments, customer or vendor related loan receivables and trade receivables are classified as fair value through other comprehensive income under IFRS 9.

23. Interest-bearing liabilities

Issuer/borrower	Instrument	Currency	Nominal (million)	Final maturity	Carrying amount EURm	
					2018	2017
Nokia Corporation	6.75% Senior Notes	EUR	231	February 2019	232	241
Nokia Corporation	5.375% Senior Notes	USD	581	May 2019	507	487
Nokia Corporation	1.00% Senior Notes	EUR	500	March 2021	499	498
Nokia Corporation	3.375% Senior Notes	USD	500	June 2022	423	406
Nokia Corporation	2.00% Senior Notes	EUR	750	March 2024	750	744
Nokia Corporation	4.375% Senior Notes	USD	500	June 2027	415	404
Nokia of America Corporation	6.50% Senior Notes	USD	74	January 2028	65	62
Nokia of America Corporation	6.45% Senior Notes	USD	206	March 2029	182	174
Nokia Corporation	6.625% Senior Notes	USD	500	May 2039	455	424
Nokia Corporation	Revolving Credit Facility	EUR	1 579	June 2020	–	–
Nokia Corporation	Loan facilities(1)(2)	EUR	750		–	–
Nokia Corporation and various subsidiaries	Other liabilities				294	326
Total					3 822	3 766

(1) A loan facility agreement of EUR 500 million for financing research and development of 5G technology was signed with the European Investment Bank (EIB) in August 2018. The availability period of the loan facility ends in February 2020. The loan facility has not yet been disbursed and will have an average maturity of approximately five years after disbursement.

(2) A loan facility agreement of EUR 250 million for financing research and development of 5G technology was signed with the Nordic Investment Bank (NIB) in December 2018. The availability period of the loan facility ends in February 2019. The loan facility has not yet been disbursed and will have an average maturity of approximately five years after disbursement.

All borrowings presented above are senior unsecured and have no financial covenants.

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The Group uses interest rate swaps and cross currency swaps to manage interest rate and foreign exchange risk related to the Group's interest-bearing liabilities. The most significant hedging instruments under fair value and cash flow hedge accounting related to the Group's interest-bearing liabilities as of December 31 are outlined in the table below:

Entity	Instrument(1)	Currency	Notional (million)	Maturity	Fair values EURm
					December 31, 2018
Nokia Corporation	Cross currency swaps	USD	581	May 2019	(29)
Nokia Corporation	Cross currency swaps	USD	500	June 2022	(16)
Nokia Corporation	Interest rate swaps	EUR	600	March 2024	7
Nokia Corporation	Cross currency swaps	USD	500	June 2027	(22)
Nokia Corporation	Cross currency swaps	USD	400	May 2039	20
Total					(40)

(1) All cross currency swaps and interest rate swaps are fixed-to-floating swaps.

Changes in interest-bearing liabilities arising from financing activities:

	Long-term interest-bearing liabilities	Short-term interest-bearing liabilities	Derivatives held to hedge long-term borrowings	Total
As of January 1, 2017	3 657	370	(30)	3 997
Cash flows	132	(40)	(49)	43
Non-cash changes:				
Acquisitions	–	4	–	4
Translation differences	(291)	(12)	199	(104)
Changes in fair value	(46)	–	15	(31)
Other	5	(13)	–	(8)
As of December 31, 2017	3 457	309	135	3 901
Cash flows	28	2	92	122
Non-cash changes:				
Translation differences	89	(1)	(138)	(50)
Changes in fair value	(4)	–	(32)	(36)
Reclassification from long-term to short-term	(739)	739	–	–
Other	(3)	(55)	–	(58)
As of December 31, 2018	2 828	994	57	3 879

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24. Fair value of financial instruments

Financial assets and liabilities recorded at fair value are categorized based on the amount of unobservable inputs used to measure their fair value. Three hierarchical levels are based on an increasing amount of judgment associated with the inputs used to derive fair valuation for these assets and liabilities, level 1 being market values for exchange traded products, level 2 being primarily based on quotes from third-party pricing services, and level 3 requiring most management judgment. At the end of each reporting period, the Group categorizes its financial assets and liabilities to appropriate level of fair value hierarchy. Items carried at fair value in the following table are measured at fair value on a recurring basis.

	Carrying amounts			Fair value through			Fair value(1)		
	Amortized cost	Fair value through profit or loss			other comprehensive income			Total	Total
		Level 1	Level 2	Level 3	Level 1	Level 2	Level 3		
EURm									
2018									
Non-current financial investments	–	8	–	682	–	–	–	690	690
Other non-current financial assets	188	–	94	6	–	85	–	373	357
Other current financial assets including derivatives	20	–	131	–	–	92	–	243	243
Trade receivables	–	–	–	–	–	4 856	–	4 856	4 856
Current financial investments	106	–	52	–	–	454	–	612	612
Cash and cash equivalents	4 531	–	1 730	–	–	–	–	6 261	6 261
Total financial assets	4 845	8	2 007	688	–	5 487	–	13 035	13 019
Long-term interest-bearing liabilities	2 828	–	–	–	–	–	–	2 828	2 820
Other long-term financial liabilities	–	–	–	14	–	–	–	14	14
Short-term interest-bearing liabilities	994	–	–	–	–	–	–	994	997
Other financial liabilities including derivatives	–	–	198	693	–	–	–	891	891
Trade payables	4 773	–	–	–	–	–	–	4 773	4 773
Total financial liabilities	8 595	–	198	707	–	–	–	9 500	9 495

EURm	Carrying amounts							Fair value(1)	
	Amortized cost	Fair value through profit or loss			Fair value through other comprehensive income			Total	Total
		Level 1	Level 2	Level 3	Level 1	Level 2	Level 3		
2017									
Non-current financial investments	119	–	–	–	16	137	544	816	816
Other non-current financial assets	108	–	99	8	–	–	–	215	195
Other current financial assets including derivatives	106	–	196	–	–	–	–	302	302
Trade receivables	6 880	–	–	–	–	–	–	6 880	6 880
Current financial investments	–	–	–	–	–	911	–	911	911
Cash and cash equivalents	7 369	–	–	–	–	–	–	7 369	7 369
Total financial assets	14 582	–	295	8	16	1 048	544	493	16 473
Long-term interest-bearing liabilities	3 457	–	–	–	–	–	–	3 457	3 574
Other long-term financial liabilities	44	–	–	672	–	–	–	716	716
Short-term interest-bearing liabilities	309	–	–	–	–	–	–	309	309
Other financial liabilities including derivatives	–	–	268	–	–	–	–	268	268
Trade payables	3 996	–	–	–	–	–	–	3 996	3 996
Total financial liabilities	7 806	–	268	672	–	–	–	8 746	8 863

(1) The following fair value measurement methods are used for items not carried at fair value: The fair values of long-term interest-bearing liabilities, including current part, are primarily based on quotes from third-party pricing services (level 2). The fair values of other assets and liabilities, including loan receivables and loans payable are primarily based on discounted cash flow analysis (level 2). The fair value is estimated to equal the carrying amount for short-term financial assets and financial liabilities due to limited credit risk and short time to maturity.

Refer to Note 2, Significant accounting policies.

The level 1 category includes financial assets and liabilities that are measured in whole by reference to published quotes in an active market. A financial instrument is regarded as quoted in an active market if quoted prices are readily and regularly available from an exchange, and those prices represent actual and regularly occurring market transactions on an arm's-length basis. This category includes only exchange traded products.

The level 2 category includes financial assets and liabilities measured using a valuation technique based on assumptions that are supported by prices from observable current market transactions. These include assets and

liabilities with fair values based on quotes from third-party pricing services, financial assets with fair values based on broker quotes and assets that are valued using the Group's own valuation models whereby the material assumptions are market observable. The majority of the Group's listed bonds and other securities, over-the-counter derivatives, trade receivables and certain other products are included within this category.

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The level 3 financial assets category includes a large number of investments in unlisted equities and unlisted venture funds, including investments managed by Nokia Growth Partners specializing in growth-stage investing. The fair value of level 3 investments is determined using one or more valuation techniques where the use of the market approach generally consists of using comparable market transactions, while the use of the income approach generally consists of calculating the net present value of expected future cash flows. For unlisted funds, the selection of appropriate valuation techniques by the fund managing partner may be affected by the availability and reliability of relevant inputs. In some cases, one valuation technique may provide the best indication of fair value while in other circumstances multiple valuation techniques may be appropriate.

The inputs generally considered in determining the fair value of level 3 investments include the original transaction price, recent transactions in the same or similar instruments, completed or pending third-party transactions in the underlying investment or comparable issuers, subsequent rounds of financing, recapitalizations or other transactions undertaken by the issuer, offerings in the equity or debt capital markets, and changes in financial ratios or cash flows, adjusted as appropriate for liquidity, credit, market and/or other risk factors. The level 3 investments are valued on a quarterly basis taking into consideration any changes, projections and assumptions, as well as any changes in economic and other relevant conditions. The fair value may be adjusted to reflect illiquidity and/or non-transferability, with the amount of such discount estimated by the managing partner in the absence of market information. Assumptions used by the managing partner due to the lack of observable inputs may impact the resulting fair value of individual investments, but no individual input has a significant impact on the total fair value of the level 3 investments.

Level 3 financial liabilities include a conditional obligation to China Huaxin as part of the Nokia Shanghai Bell definitive agreements where China Huaxin obtained the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group in exchange for a future cash settlement. The fair value of the liability is calculated using the net present value of the expected future cash settlement. The most significant unobservable valuation inputs include certain financial performance metrics of Nokia Shanghai Bell. No individual input has a significant impact on the total fair value of the level 3 financial liability. Refer to Note 33, Significant partly-owned subsidiaries.

Reconciliation of the opening and closing balances on level 3 financial assets and liabilities:

EURm	Level 3 Financial Assets	Level 3 Financial Liabilities
As of January 1, 2017	674	(14)
Net gains in income statement	89	79
Net loss recorded in other comprehensive income	(89)	–
Acquisitions of non-controlling interest	–	(737)
Purchases	89	–
Sales	(182)	–
Other movements	(29)	–
As of December 31, 2017	552	(672)
Adoption of IFRS 9(1)	122	–
As of January 1, 2018	674	(672)
Net gains/(losses) in income statement	49	(34)
Additions	119	–
Deductions	(150)	8
Other movements	(4)	(9)
As of December 31, 2018	688	(707)

(1)

Non-current available-for-sale investments for which the fair value was estimated to equal cost less impairment under IAS 39, as their fair value was not possible to estimate reliably, are classified as level 3 financial assets at fair value through profit or loss under IFRS 9.

The gains and losses from venture fund and similar investments categorized in level 3 are included in other operating income and expenses. A net loss of EUR 96 million (net gain of EUR 63 million in 2017) related to level 3 financial instruments held as of December 31, 2018 is recognized in the consolidated income statement.

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25. Derivative financial instruments

EURm 2018	Assets		Liabilities	
	Fair value(1)	Notional(2)	Fair value(1)	Notional(2)
Hedges on net investment in foreign subsidiaries				
Foreign exchange forward contracts	11	2 562	(23)	4 050
Currency options bought	1	235	–	–
Cash flow hedges				
Foreign exchange forward contracts	5	619	(26)	787
Currency options bought	9	507	(0)	40
Currency options sold	–	–	(0)	15
Fair value hedges				
Interest rate swaps	7	600	–	–
Foreign exchange forward contracts	2	218	(6)	543
Firm commitments	14	466	(1)	234
Cash flow and fair value hedges(3)				
Cross-currency interest rate swaps	22	260	(69)	1 512
Derivatives not designated in hedge accounting relationships carried at fair value through profit and loss				
Foreign exchange forward contracts	59	6 257	(43)	5 315
Currency options bought	1	99	–	–
Other derivatives	–	–	(10)	104
Total	131	11 823	(178)	12 600
2017				
Hedges on net investment in foreign subsidiaries				
Foreign exchange forward contracts	38	3 491	(2)	773
Cash flow hedges				
Foreign exchange forward contracts	56	1 305	(6)	465
Fair value hedges				
Foreign exchange forward contracts	1	165	(1)	79
Firm commitments	17	133	(24)	229
Cash flow and fair value hedges(3)				
Cross-currency interest rate swaps	–	–	(141)	1 512
Derivatives not designated in hedge accounting relationships carried at fair value through profit and loss				
Foreign exchange forward contracts	73	5 858	(88)	7 002
Currency options bought	12	664	–	–
Currency options sold	–	–	(4)	163
Other derivatives	–	–	(2)	100
Total	197	11 616	(268)	10 323

(1) Included in other financial assets and other financial liabilities in the consolidated statement of financial position.

(2) Includes the gross amount of all notional values for contracts that have not yet been settled or cancelled. The amount of notional value outstanding is not necessarily a measure or indication of market risk as the exposure of certain contracts may be offset by that of other contracts.

(3)

Cross-currency interest rate swaps have been designated partly as fair value hedges and partly as cash flow hedges.

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26. Share-based payment

The Group has several equity-based incentive programs for executives and other eligible employees. The programs consist of performance share plans, restricted share plans and employee share purchase plans. The equity-based incentive grants are generally conditional on continued employment as well as the fulfillment of the performance, service and other conditions determined in the relevant plan rules. The share-based payment expense, including social security costs, for all equity-based incentive grants in the consolidated income statement amounts to EUR 62 million (EUR 99 million in 2017 and EUR 130 million in 2016).

Active share-based payment plans by instrument

	Performance shares outstanding at target		Restricted shares outstanding	
	Number of	Weighted average	Number of	Weighted average
	performance	grant	restricted	grant
	shares at target	date fair value	shares	date fair value
		EUR(1)	outstanding	EUR(1)
As of January 1, 2016	22 928 850		2 104 474	
Granted	23 110 479	4.70	5 406 682	4.73
Forfeited	(1 489 070)		(255 023)	
Vested(2)	(1 132 709)		(1 286 596)	
As of December 31, 2016	43 417 550		5 969 537	
Granted	29 983 190	5.08	2 366 008	4.90
Forfeited	(2 589 904)		(807 556)	
Vested(2)	(10 294 593)		(1 959 287)	
As of December 31, 2017	60 516 243		5 568 702	
Granted	36 943 251	4.39	1 479 350	4.47
Forfeited	(4 146 246)		(1 431 215)	
Vested(2)	(10 169 717)		(2 034 789)	
As of				
December 31, 2018(3)	83 143 531		3 582 048	

(1) The fair values of performance and restricted shares are estimated based on the grant date market price of the Nokia share less the present value of dividends expected to be paid during the vesting period.

(2) Vested performance shares at target are multiplied by the confirmed payout (% of target) to calculate the total number of Nokia shares settlement.

(3) Includes 18 969 595 performance shares for the Performance Share Plan 2016 and 178 428 Restricted Shares that vested on January 1, 2019.

Performance shares

In 2018, the Group administered four global performance share plans, the Performance Share Plans of 2015, 2016, 2017 and 2018. The performance shares represent a commitment by the Group to deliver Nokia shares to eligible participants at a future point in time, subject to the fulfillment of predetermined performance criteria. The number of performance shares at target is the amount of performance shares granted to an individual that will be settled if the target performance, with respect to the performance criteria, is achieved. Any additional payout beyond the minimum amount will be determined based on the financial performance against the established performance criteria during the two-year performance period. At maximum performance, the settlement amounts to two times the amount at target.

Until the Nokia shares are delivered, the participants do not have any shareholder rights, such as voting or dividend rights, associated with the performance shares. The performance share grants are generally forfeited if the employment relationship with the Group terminates prior to vesting.

The Performance Share Plan 2018 includes a minimum payout guarantee for performance shares granted to non-executive participants, such that 25% of the performance shares granted will settle after the restriction period, regardless of the satisfaction of the applicable performance criteria. Performance shares granted to executive participants under the Performance Share Plan 2018 do not include a minimum payout guarantee.

Global performance share plans as of December 31, 2018:

Plan	Performance shares outstanding at target	Confirmed payout (% of target)	Performance period	Restriction period(1)	Settlement year
2015	–	124	2015-2016	2017	2018
2016	18 969 595	46	2016-2017	2018	2019
2017	27 696 747	29	2017-2018	2019	2020
2018	36 477 189	–	2018-2019	2020	2021

(1) The restriction period will be no less than one year from the end of the performance period.

The 2018 performance share plan has a two-year performance period (2018-2019) and a subsequent one-year restriction period. The number of performance shares to be settled would be determined with reference to the performance targets during the performance period. Under the 2018 performance share plan the performance criteria are: Nokia annual earnings per share (diluted), annual free cash flow and revenue relative to market. The criteria exclude costs related to the acquisition of Alcatel Lucent and related integration, goodwill impairment charges, intangible asset amortization and other purchase price fair value adjustments, restructuring and associated charges and certain other items.

Restricted shares

In 2018, the Group administered four global restricted share plans: the Restricted Share Plans 2015, 2016, 2017 and 2018. Restricted shares are granted on a limited basis for purposes related to retention and recruitment of individuals deemed critical to the Group's future success. The vesting schedule for the plans follow a tranche vesting schedule whereby each plan vests in three equal tranches on the first, second and the third anniversary of the award subject to continued employment with the Group. Restricted Share Plan participants do not have any shareholder rights, such as voting or dividend rights, until the Nokia shares are delivered. The restricted share grants are generally forfeited if the employment relationship with the Group terminates prior to vesting of the applicable tranche or tranches.

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Employee share purchase plan

The Group offers a voluntary Employee Share Purchase Plan to its employees. Participating employees make contributions from their net salary to purchase Nokia shares on a monthly basis during a 12 month savings period. The Group intends to deliver one matching share for every two purchased shares the employee holds as of the end of the Plan cycle. In 2018, 3 980 286 matching shares were issued as a settlement to the participants of the Employee Share Purchase Plan 2017 (2 920 204 matching shares issued under the 2016 Plan in 2017 and 1 661 951 matching issued under the 2015 plan and 601 408 free shares issued under the 2016 plan in 2016).

Legacy equity compensation programs

Stock options

In 2018, the Group administered one global stock option plan, the Stock Option Plan 2011. The last stock options under this Plan were granted in 2013. Each stock option entitles the holder to subscribe for one new Nokia share. The stock options are non-transferable and may be exercised for shares only. Shares will be eligible for dividends for the financial year in which the share subscription takes place. Other shareholder rights will commence on the date on which the subscribed shares are entered in the Trade Register. The stock option grants are generally forfeited if the employment relationship with the Group is terminated.

Reconciliation of stock options outstanding and exercisable:

	Number	Weighted average exercise price EUR	Weighted average share price EUR	Number of options exercisable	Weighted average exercise price EUR
Shares under option					
As of January 1, 2016	3 640 286	4.67		2 318 911	5.97
Exercised	(832 900)	2.52	4.87		
Forfeited	(17 875)	2.57			
Expired	(1 188 490)	7.81			
As of December 31, 2016	1 601 021	3.34		1 197 771	3.56
Exercised	(415 750)	2.13	4.93		
Forfeited	(215 000)	2.71			
Expired	(522 771)	5.65			
As of December 31, 2017	447 500	2.07		447 500	2.07
Exercised	(424 500)	2.06	5.07		
Forfeited	–				
Expired	–				
As of December 31, 2018	23 000	2.35		23 000	2.35

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27. Pensions and other post-employment benefits

The Group maintains a number of post-employment plans in various countries including both defined benefit and defined contribution plans. The Group participates in defined contribution plans, multi-employer and insured plans for which the Group contributions are recognized as expense in the consolidated income statement in the period to which the contributions relate. In a defined contribution plan, the Group's legal or constructive obligation is limited to the amount that it agrees to contribute to the fund. The amount recognized in the consolidated income statement related to defined contribution plans was EUR 246 million (EUR 231 million in 2017 and EUR 236 million in 2016).

The Group's defined benefit plans comprise significant pension programs and schemes as well as material other post-employment benefit (Opeb) plans providing post-retirement healthcare and life insurance coverage to certain employee groups. Defined benefit plans expose the Group to various risks such as investment risk, interest rate risk, life expectancy risk, and regulatory/compliance risk. The characteristics and extent of these risks vary depending on the legal, fiscal, and economic requirements in each country. The amount recognized in the consolidated income statement related to defined benefit plans was EUR 234 million (EUR 214 million in 2017 and EUR 222 million in 2016).

The total net defined benefit liability is EUR 103 million (EUR 461 million in 2017) consisting of net pension and other post-employment benefit liabilities of EUR 4 327 million (EUR 4 440 million in 2017) and net pension and other post-employment benefit assets of EUR 4 224 million (EUR 3 979 million in 2017).

Defined benefit plans

The Group's most significant defined benefit pension plans are in the United States, Germany, and the United Kingdom. Together they account for 92% (93% in 2017) of the Group's total defined benefit obligation and 91% (91% in 2017) of the Group's total plan assets.

The defined benefit obligations, the fair value of plan assets, the effects of the asset ceiling and the net defined benefit balance as of December 31:

	2018			Net defined	2017			Net defi
	Defined	Fair value	Effects of	benefit	Defined	Fair value	Effects of	benefit
	obligation	of plan assets	asset ceiling	balance	obligation	of plan assets	asset ceiling	balance
	(18 346)	19 616	(573)	697	(19 614)	20 499	(453)	432
	(2 650)	1 145	–	(1 505)	(2 773)	1 203	–	(1 570)
	(1 122)	1 459	–	337	(1 276)	1 552	–	276
	(1 837)	2 259	(54)	368	(1 834)	2 281	(46)	401
	(23 955)	24 479	(627)	(103)	(25 497)	25 535	(499)	(461)

United States

The Group has significant defined benefit pension plans and a significant post-retirement (Opeb) welfare benefit plan, providing post-retirement healthcare benefits and life insurance coverage, in the United States. The pension plans include both traditional service-based programs as well as cash-balance plans. The principal non-represented plan for

salaried, non-union member employees was closed to new entrants after December 31, 2007 and fully frozen on December 31, 2009. Effective on January 1, 2015, the Group, then Alcatel Lucent, adopted a new cash-balance program, for salaried, non-union member employees. The new program was extended to all United States-based salaried employees, except the employees of Nokia Technologies, effective January 1, 2017. For active union-represented employees and for former employees who, when active, were represented by a union, the Group maintains two defined benefit pension plans, both of which are traditional service-based pension programs. The larger of the two, which represents 95% of the obligation, is a closed plan. Post-retirement welfare benefits are maintained for certain retired former employees. Pursuant to an agreement with the Communications Workers of America (CWA) and the International Brotherhood of Electrical Workers (IBEW) unions, the Group agreed to continue to provide post-retirement healthcare benefits and life-insurance coverage for employees formerly represented by these two unions. That agreement expires on December 31, 2019.

The defined benefit obligations, the fair value of plan assets, the effects of the asset ceiling and the net defined benefit balance for United States defined benefit plans as of December 31:

	2018 Defined benefit obligation	Fair value of plan assets	Effects of asset ceiling	Net defined benefit balance	2017 Defined benefit obligation	Fair value of plan assets	Effects of asset ceiling	Net d benefit balan
ment d and	(12 860)	14 617	–	1 757	(13 750)	15 263	(2)	1 511
tional ly	(2 766)	4 602	(573)	1 263	(2 995)	4 704	(451)	1 258
nted) mental	(336)	–	–	(336)	(351)	–	–	(351)
irement s	(15 962)	19 219	(573)	2 684	(17 096)	19 967	(453)	2 418
ion nted)	(66)	–	–	(66)	(76)	–	–	(76)
ly	(972)	184	–	(788)	(1 026)	264	–	(762)
nted) ife ion nted) ife ly	(885)	149	–	(736)	(929)	186	–	(743)
nted)	(460)	64	–	(396)	(486)	82	–	(404)
	(1)	–	–	(1)	(1)	–	–	(1)
	(2 384)	397	–	(1 987)	(2 518)	532	–	(1 986)

Germany

The Group maintains two primary plans in Germany which cover the majority of active employees: the cash balance plan Beitragsorientierter Altersversorgungs Plan (BAP) for the Group's former Nokia employees and a similar cash balance program (AVK Basis-/Matchingkonto) for the

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Group's former Alcatel Lucent employees. Individual benefits are generally dependent on eligible compensation levels, ranking within the Group and years of service. These plans are partially funded defined benefit pension plans, the benefits being subject to a minimum return guaranteed by the Group. The funding vehicle for the BAP plan is the NSN Pension Trust e.V. The trust is legally separate from the Group and manage the plan assets in accordance with the respective trust agreements.

All other plans have been frozen or closed in prior years and replaced by the cash balance plans. Benefits are paid in annual installments, as monthly retirement pension, or as a lump sum on retirement in an amount equal to accrued pensions and guaranteed interest.

United Kingdom

The Group has two pension Trusts in the United Kingdom. Both trusts, legacy Nokia and legacy Alcatel-Lucent, have money purchase sections with Guaranteed Minimum Pension (GMP) underpin and final salary sections. All final salary sections are closed to future benefit accrual, the legacy Nokia plan closed on April 30, 2012 and the legacy Alcatel-Lucent plan on 30 April, 2018. Both Trusts manage all investments for their respective pension plans. Individual benefits for final salary sections are dependent on eligible compensation levels and years of service. For the money purchase sections with GMP underpin, individual benefits are dependent on the greater of the value of GMP at retirement date or the pension value resulting from the individual's invested funds.

Impact on the consolidated financial statements

Movements in the defined benefit obligation, fair value of plan assets and the impact of the asset ceiling

The movements in the present value of the defined benefit obligation for the years ended December 31:

EURm	2018				2017			
	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of January 1	(17 096)	(2 518)	(5 883)	(25 497)	(19 784)	(3 061)	(5 818)	(28 663)
Current service cost	(70)	–	(93)	(163)	(75)	–	(105)	(180)
Interest expense	(540)	(79)	(106)	(725)	(652)	(98)	(112)	(862)
Past service cost and gains on curtailments	(44)	–	(8)	(52)	(39)	(1)	43	3
Settlements	–	–	(1)	(1)	13	–	10	23
Total	(654)	(79)	(208)	(941)	(753)	(99)	(164)	(1 016)
Remeasurements:								
Gain/(loss) from change in demographic assumptions	36	23	21	80	141	33	(38)	136
Gain/(loss) from change in financial	938	155	205	1 298	(747)	(141)	(148)	(1 036)

assumptions								
Experience								
gain/(loss)	56	(10)	33	79	60	204	3	267
Total	1 030	168	259	1 457	(546)	96	(183)	(633)
Translation								
differences	(717)	(105)	15	(807)	2 422	370	123	2 915
Contributions								
from plan								
participants	–	(115)	(23)	(138)	–	(111)	(24)	(135)
Benefits paid	1 475	278	235	1 988	1 555	303	246	2 104
Other	–	(13)	(4)	(16)	10	(16)	(63)	(69)
Total	758	45	223	1 026	3 987	546	282	4 815
As of				(23				(25
December 31	(15 962)	(2 384)	(5 609)	955)	(17 096)	(2 518)	(5 883)	497)

Present value of obligations includes EUR 17 593 million (EUR 18 940 million in 2017) of wholly funded obligations, EUR 5 162 million (EUR 5 248 million in 2017) of partly funded obligations and EUR 1 200 million (EUR 1 310 million in 2017) of unfunded obligations.

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The movements in the fair value of plan assets for the years ended December 31:

EURm	2018				2017			
	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of January 1	19 967	532	5 036	25 535	22 301	579	4 890	27 770
Interest income	635	15	95	745	738	16	101	855
Administrative expenses and interest on asset ceiling	(17)	–	(1)	(18)	(17)	–	(1)	(18)
Settlements	–	–	(3)	(3)	(12)	–	(11)	(23)
Total	618	15	91	724	709	16	89	814
Remeasurements:								
Return on plan assets, excluding amounts included in interest income	(775)	(25)	(187)	(987)	1 369	37	183	1 589
Total	(775)	(25)	(187)	(987)	1 369	37	183	1 589
Translation differences	868	19	(21)	866	(2 725)	(71)	(111)	(2 907)
Contributions:								
Employers	26	6	65	97	28	3	129	160
Plan participants	–	115	23	138	–	111	24	135
Benefits paid	(1 475)	(278)	(145)	(1 898)	(1 555)	(303)	(158)	(2 016)
Section 420 Transfer(1)	(13)	13	–	–	(160)	160	–	–
Other	3	–	1	4	–	–	(10)	(10)
Total	(591)	(125)	(77)	(793)	(4 412)	(100)	(126)	(5 038)
As of December 31	19 219	397	4 863	24 479	19 967	532	5 036	25 535

(1) Section 420 Transfer. Refer to 'Future Cash Flow' section below.

The movements in the funded status for the years ended December 31:

EURm	2018				2017			
	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of January 1	2 871	(1 986)	(847)	38	2 517	(2 482)	(928)	(893)
Current service cost	(70)	–	(93)	(163)	(75)	–	(105)	(180)
Interest income/(expense)	78	(64)	(12)	2	69	(82)	(12)	(25)
Past service cost and gains on	(44)	–	(8)	(52)	(39)	(1)	43	3

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Termination curtailments								
Settlements	–	–	(4)	(4)	1	–	(1)	–
Total	(36)	(64)	(117)	(217)	(44)	(83)	(75)	(202)
Remeasurements:								
Return on plan								
assets, excluding								
amounts included								
in interest income	(775)	(25)	(187)	(987)	1 369	37	183	1 589
Gain/(loss) from								
change in								
demographic								
assumptions	36	23	21	80	141	33	(38)	136
Gain/(loss) from								
change in								
financial								(1
assumptions	938	155	205	1 298	(747)	(141)	(148)	036)
Experience								
gain/(loss)	56	(10)	33	79	60	204	3	267
Total	255	143	72	470	823	133	–	956
Translation								
differences	151	(86)	(6)	59	(303)	299	12	8
Employer								
contributions	26	6	65	97	28	3	129	160
Benefits paid	–	–	90	90	–	–	88	88
Section 420								
Transfer(1)	(13)	13	–	–	(160)	160	–	–
Other	3	(13)	(3)	(13)	10	(16)	(73)	(79)
Total	167	(80)	146	233	(425)	446	156	177
As of December								
31	3 257	(1 987)	(746)	524	2 871	(1 986)	(847)	38

(1) Section 420 Transfer. Refer to 'Future Cash Flow' section below.

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The movements in the impact of the asset ceiling limitation for the years ended December 31:

	2018				2017			
EURm	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of January 1	(453)	–	(46)	(499)	(265)	–	(40)	(305)
Interest expense	(16)	–	(1)	(17)	(11)	–	(1)	(12)
Remeasurements:								
Change in asset ceiling, excluding amounts included in interest expense	(76)	–	(6)	(82)	(224)	–	(9)	(233)
Translation differences	(28)	–	(1)	(29)	47	–	4	51
As of December 31	(573)	–	(54)	(627)	(453)	–	(46)	(499)
Net balances as of December 31:								

	2018				2017			
EURm	United States pension	United States Opeb	Other pension	Total	United States pension	United States Opeb	Other pension	Total
As of December 31	2 684	(1 987)	(800)	(103)	2 418	(1 986)	(893)	(461)

Asset ceiling limitation

IAS19, Employee benefits, limits the amount of pension fund surplus that an entity may recognize to the amount of economic benefit that the entity can realize, either through refunds or as reductions in future contributions. The most significant limitation of asset recognition for the Group is from the overfunded US formerly represented pension plan. Under IAS 19 and current plan terms, the surplus is treated as belonging to the plans and its participants and cannot be refunded to the sponsoring employer. The surplus is therefore not recognized by the Group as a recoverable pension asset. However, Section 420 of the US tax code (described in the Future Cash Flows section) allows for some portion of the surplus assets to be used to cover some portion of the opeb liabilities. This increases the amount of the asset surplus that is recognizable in the US prepaid pension assets. All other countries where asset ceiling limits apply are not considered material. The Group recognized an asset ceiling limitation in the amount of EUR 627 million (EUR 499 million in 2017).

Recognized in the income statement

Recognized in personnel expenses in the consolidated income statement for the years ended December 31:

EURm	2018	2017	2016
Current service cost(1)	163	180	155
Past service cost and gains on curtailments(2)	52	(3)	2

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Interest expense(3)	15	37	65
Settlements(2)	4	–	–
Total	234	214	222
Of which relates to:			
United States pensions	52	55	32
United States Opeb	64	83	92
Other pensions	118	76	98

(1) Included in operating expenses within the consolidated income statement.

(2) Included in other operating income and expense within the consolidated income statement.

(3) Included in financial income and expense within the consolidated income statement.

Recognized in other comprehensive income

Recognized in other comprehensive income for the years ended December 31:

EURm	2018	2017	2016
Return on plan assets, excluding amounts included in interest income	(987)	1 589	1 340
Gain from change in demographic assumptions	80	136	81
Gain/(loss) from change in financial assumptions	1 298	(1 036)	(954)
Experience gain	79	267	358
Change in asset ceiling, excluding amounts included in interest expense	(82)	(233)	(259)
Total	388	723	566
Of which relates to:			
United States pensions	179	599	701
United States Opeb	143	133	166
Other pensions	66	(9)	(301)

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Actuarial assumptions and sensitivity analysis

Actuarial assumptions – Global View

Assumptions regarding future mortality are set based on actuarial advice in accordance with published statistics and experience in each country.

The discount rates and mortality tables used for the significant plans:

	2018	2017	2018
	Discount rate %		Mortality table
United States	3.9	3.3	RP–2014 w/MP–2018 mortality projection scale
Germany	1.6	1.3	Heubeck 2018G
United Kingdom(1)	2.7	2.5	S2PA Light
Total weighted average for all countries	3.5	2.9	

(1) Tables are adjusted with 1.5% long-term rate of improvement.

The principal actuarial weighted average assumptions used for determining the defined benefit obligation:

%	2018	2017
Discount rate for determining present values	3.5	2.9
Annual rate of increase in future compensation levels	1.9	1.9
Pension growth rate	0.4	0.4
Inflation rate	2.1	2.1
Weighted average duration of defined benefit obligations	11 yrs	11 yrs

Actuarial assumptions – United States

Actuarial assumptions used for determining the defined benefit obligation:

%	2018	2017
Benefit obligation, discount rate		
Pension	3.9	3.3
Post-retirement healthcare and other	3.7	3.1
Post-retirement group life	4.0	3.4
Annual rate of increase in future compensation levels	2.05	2.06
Assumed healthcare cost trend rates		
Healthcare costs trend rate assumed for next year	6.3	11.5
Healthcare cost trend rate assumed for next year (excluding post-retirement dental benefits)	6.4	11.8
Terminal growth rate	4.9	4.9
Year that the rate reaches the terminal growth value	2028	2028

Sensitivity analysis – Global View

When calculating the sensitivity of the defined benefit obligation to significant actuarial assumptions, the present value of the defined benefit obligation is calculated using the projected unit credit method. The sensitivity analyses are based on a change in an assumption while holding all other assumptions constant and may not be representative of the actual impact of changes. If more than one assumption is changed simultaneously, the combined impact of changes would not necessarily be the same as the sum of the individual changes. If the assumptions change to a different level compared with that presented, the effect on the defined benefit obligation may not be linear. Increases and decreases in the principal assumptions which are used in determining the defined benefit obligation, do not have a symmetrical effect on the defined benefit obligation primarily due to the compound interest effect created when determining the net present value of the future benefit.

The sensitivity of the defined benefit obligation to changes in the principal assumptions:

	Change in assumption		Increase in assumption(1) EURm	Decrease in assumption(1) EURm
Discount rate for determining present values	1.0	%	2 154	(2 593)
Annual rate of increase in future compensation levels	1.0	%	(116)	100
Pension growth rate	1.0	%	(494)	430
Inflation rate	1.0	%	(454)	367
Healthcare cost trend rate	1.0	%	(41)	34
Life expectancy	1	year	(882)	829

(1) Positive movement indicates a reduction in the defined benefit obligation; a negative movement indicates an increase in the defined benefit obligation.

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Investment strategies

The overall pension investment objective of the Group is to preserve or enhance the pension plans' funded status through the implementation of an investment strategy that maximizes return within the context of minimizing surplus risk. In formulating the asset allocation for the Plans, multiple factors are considered, including, but not limited to the long-term risk and return expectations for a variety of asset classes as well as current and multi-year projections of the pension plans' demographics, benefit payments, contributions and funded status. Local trustee boards are responsible for conducting asset liability studies, when appropriate; overseeing the investment of plan assets; and monitoring and managing associated risks under company oversight and in accordance with local law. The results of the Asset-Liability framework are implemented on a plan level.

The Group's pension investment managers may use derivative financial instruments including futures contracts, forward contracts, options and interest rate swaps to manage market risk. The performance and risk profile of investments is regularly monitored on a stand-alone basis as well as in the broader portfolio context. One risk is a decline in the plan's funded status as a result of the adverse performance of plan assets and/or defined benefit obligations. The application of the Asset-Liability Model study focuses on minimizing such risks.

Disaggregation of plan assets

EURm	2018				2017			
	Quoted	Unquoted	Total	%	Quoted	Unquoted	Total	%
Equity securities	1 735	23	1 758	7	1 857	1	1 858	7
Fixed income securities	17 195	203	17 398	71	17 810	44	17 854	70
Insurance contracts	–	901	901	4	–	1 013	1 013	4
Real estate	–	1 332	1 332	5	–	1 350	1 350	5
Short-term investments	515	40	555	2	709	14	723	3
Private equity and other	114	2 421	2 535	11	–	2 737	2 737	11
Total	19 559	4 920	24 479	100	20 376	5 159	25 535	100

Most short-term investments including cash, equities and fixed-income securities have quoted market prices in active markets. Equity securities represent investments in equity funds and direct investments, which have quoted market prices in an active market. Debt securities represent investments in government and corporate bonds, as well as investments in bond funds, which have quoted market prices in an active market. Debt securities may also comprise investments in funds and direct investments. Insurance contracts are customary pension insurance contracts structured under domestic law in the respective countries. Real estate investments are investments in commercial properties or real estate funds which invest in a diverse range of real estate properties. Short-term investments are liquid assets or cash which are being held for a short period of time, with the primary purpose of controlling the tactical asset allocation. Other includes commodities as well as alternative investments, including derivative financial instruments.

United States plan

United States plan asset target and actual allocation range of the pension and opeb trust by asset category as of December 31, 2018:

Pension target	Percentage of	Post-retirement	Percentage of post-
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%	allocation range	plan assets	target allocation	employment plan assets
Equity securities	5 - 9	4	46	46
Fixed income securities	67 - 89	78	17	17
Real estate	4 - 8	6	–	–
Short-term investments	–	–	37	37
Private equity and other	6 - 13	12	–	–
Total		100	100	100

The majority of the Group's United States pension plan assets are held in a master pension trust. The opeb plan assets are held in two separate trusts. The Pension & Benefits Investment Committee formally approves the target allocation ranges every few years on the completion of the asset-liability study by external advisors and internal investment management. The overall United States pension plan asset portfolio reflects a balance of investments split of approximately 22/78 between equity, including alternative investments for this purpose, and fixed income securities.

United States pension plan assets included EUR 0.2 million of Nokia ordinary shares and EUR 0.5 million of Nokia bonds as of December 31, 2018 (EUR 0.15 million of Nokia ordinary shares and EUR 0.5 million of Nokia bonds in 2017).

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Significant events in 2018

Plan amendments

UK GMP equalization

UK high court has ruled that the trustees of UK defined benefit pension schemes must compensate members for gender based differences attributable to guaranteed minimum pensions (GMPs). Implementation of this ruling resulted in an expense of EUR 3 million, recognized as past service costs in the consolidated income statement.

Germany Transition Payments ruling

German Federal Labor Court has ruled that employees that leave Nokia prior to retirement are also eligible to the transition payments benefit. Implementation of this ruling resulted in an expense of EUR 15 million, recognized as past service costs in the consolidated income statement.

Germany Mortality Table update

Heubeck AG published an update to the 2005 mortality table, Heubeck Richttafeln RT 2018 G. The update results in an increase of the liability in Germany and resulted in an actuarial loss due to changes in demographic assumptions of EUR 27 million, recognized as pension remeasurement in the consolidated statement of comprehensive income.

India Legislation update for Gratuity Plan

The Indian Government has passed a new bill doubling the tax exemption gratuity limit. Implementation of this increased gratuity has resulted in an expense of EUR 4 million, recognized as past service costs in the consolidated income statement.

Curtailments

In 2018, the Group recognized curtailments in a number of countries. In the United States, restructuring activities resulted in a loss on curtailment of EUR 44 million driven by severance-related pension benefit enhancement. Curtailments were recognized as past service costs in the consolidated income statement.

Future cash flows

Contributions

Group contributions to the pension and other post-retirement benefit plans are made to facilitate future benefit payments to plan participants. The funding policy is to meet minimum funding requirements as set forth in the employee benefit and tax laws, as well as any such additional amounts as the Group may determine appropriate. Total contributions expected to be paid in 2019 total EUR 91 million.

United States pension plans

Funding methods

Funding requirements for the three United States qualified defined benefit pension plans are determined by the applicable statutes, namely the Employee Retirement Income Security Act of 1974 (ERISA), the Internal Revenue

Code of 1986, and regulations issued by the Internal Revenue Service (IRS).

In determining funding requirements, ERISA allows assets to be either market value or an average value over a period of time; and liabilities to be based on spot interest rates or average interest rates over a period of time. A preliminary assessment indicates that no funding is required for the non-represented and represented pension plans until, at least 2019. For the formerly represented pension plan, the Group does not foresee any future funding requirement for regulatory funding purposes, given the plan's asset allocation and the level of assets compared to liabilities.

Healthcare benefits for both management and formerly union represented retirees' benefits are capped for those who retired after February 28, 1990. The benefit obligation associated with this group of retirees is approximately 56% of the total United States retiree healthcare obligation as of December 31, 2018. Medicare is the primary payer for those aged 65 and older, comprising almost all of uncapped retirees.

Section 420 transfer

Section 420 of the US Internal Revenue Code (Section 420) allows for the transfer of pension assets in excess of specified thresholds (excess pension assets) over the plan's funding obligation to be used to fund healthcare benefits and/or life insurance coverage (Opeb) of retired employees entitled to pension benefits under the plan. Section 420 requires employers making such transfers to continue to provide healthcare benefits or life insurance coverage, as the case may be, to those retirees for a certain period of time (cost maintenance period) at levels prescribed by regulations.

For retirees who were represented by the CWA and IBEW, the Group expects to fund the current retiree healthcare and group life insurance obligations with Section 420 transfers from the formerly represented pension plan's pension surplus. This is considered as a refund from the pension plan when setting the asset ceiling.

Section 420 is currently set to expire on December 31, 2025. The Group expects to continue to make Section 420 transfers from the formerly represented pension plan to fund healthcare benefits and group life insurance coverage for formerly represented retirees.

Group Contributions

The following table summarizes expected contributions to the Group pension and post-retirement plans for 2019 and for the US pension and post-retirement plans until 2028. These figures include the reimbursements the Group expects to receive with respect to the US coverage provided to US plan participants eligible for the Medicare prescription drug benefit. The Group did not make contributions to the US qualified pension plans in 2018, nor does it expect to make any contributions in 2019. Actual contributions may differ from expected contributions due to various factors, including performance of plan assets, interest rates and legislative changes.

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	US Pension	US Post-retirement		Medicare subsidy for formerly union represented(1)	Other Countries	Total for Group
EURm	Non-qualified plans	Non-represented	Other benefit plans			
2019	26	9	3	(14)	53	77
2020	26	8	3	(13)		
2021	25	8	3	(13)		
2022	25	8	10	(12)		
2023	24	7	50	(12)		
2024-2028	114	30	261	(49)		

(1) Medicare Subsidy is recorded within other movements in the reconciliation of the present value of the defined benefit obligation.

Benefit payments

The following table summarizes expected benefit payments from the pension and post-retirement plans and other post-employment benefit plans until 2028. Actual benefit payments may differ from expected benefit payments. The amounts for the United States plans are net of expected plan participant contributions, as well as the annual Medicare Part D subsidy of approximately EUR 14 million.

EURm	United States direct benefit payments			Post-retirement		Other countries	Total
	Pension Qualified management	Qualified occupational	Non-qualified plans	Formerly union represented	Non-union represented		
2019	1 284	277	26	128	54	262	2 031
2020	1 089	264	26	162	55	257	1 853
2021	1 045	252	25	158	56	272	1 808
2022	1 008	240	25	140	57	265	1 735
2023	970	228	24	128	57	297	1 704
2024-2028	4 275	964	114	513	291	1 446	7 603

Benefits are paid from plan assets where there is sufficient funding available to the plan to cover the benefit obligation. Any payments in excess of the plan assets are paid directly by Nokia. Direct benefit payments expected to be paid in 2019 total EUR 126 million.

28. Accrued expenses, deferred revenue and other liabilities

Non-current

EURm	2018	2017
Deferred revenue(1)	770	2 204
Discounted non-interest-bearing liabilities(2)	–	690
Salaries, wages and social charges	54	59

Other	28	33
Total	852	2 986

Current

EURm	2018	2017
Deferred revenue(1)	155	3 057
Salaries, wages and social charges	1 426	1 551
VAT and other indirect taxes	387	453
Discount accruals(3)	604	–
Accrued expenses related to customer projects	617	704
Other	751	901
Total	3 940	6 666

- (1) Non-current deferred revenue EUR 770 million (EUR 924 million in 2017) and current deferred revenue EUR 155 million (EUR 155 million in 2017) relates to an IP licensing contract which was determined to be a completed contract as defined in the transition guidance of the IFRS 15 standard. Other liabilities related to contracts with customers presented in deferred revenue in 2017 are included in non-current and current contract liabilities following the adoption of IFRS 15. Refer to Note 2, Significant accounting policies, Note 3, New and amended standards and interpretations and Note 8, Revenue recognition.
- (2) In 2017, discounted non-interest bearing liabilities included EUR 672 million financial liability related to the conditional obligation to China Huaxin as part of the Nokia Shanghai Bell definitive agreements where China Huaxin obtained the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group in exchange for a future cash settlement. In 2018, the Group reclassified the financial liability to other financial liabilities within current liabilities in line with the option exercise period. Refer to Note 33, Significant partly-owned subsidiaries.
- (3) Discount accruals represent customer credits without any outstanding future performance obligations. Other accruals include accrued royalties, research and development expenses, marketing expenses and interest expenses, as well as various amounts which are individually insignificant.

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29. Provisions

	Restructuring	Warranty	Litigation	Environmental	Project losses	Divestment-related	Material liability	Other
January 1,	713	207	183	134	131	110	77	523
Changes in business combinations	–	–	–	–	–	–	–	6
Changes in estimates	(13)	(10)	(9)	(11)	(6)	(8)	(4)	(23)
Utilization	–	–	7	(12)	–	(4)	15	(2)
Change in income tax provision	577	146	56	14	8	15	56	261
Changes in estimates	(55)	(56)	(30)	(1)	(1)	(7)	(38)	(52)
Change in income tax provision	522	90	26	13	7	8	18	209
Change during period	(500)	(77)	(77)	(17)	(56)	(30)	(40)	(212)
December 31,	722	210	130	107	76	76	66	501
Changes in business combinations	2	–	(11)	4	1	(5)	2	3
Changes in estimates	(18)	–	9	(1)	–	–	(1)	11
Change in income tax provision	289	171	32	11	–	–	81	86
Changes in estimates	(51)	(75)	(9)	(3)	(10)	(5)	(51)	(206)
Change in income tax provision	238	96	23	8	(10)	(5)	30	(120)
Change during period	(451)	(111)	(42)	(10)	(12)	–	(25)	(66)
December 31, 2018	493	195	109	108	55	66	72	329

(1) The changes in estimates in other provisions include a release of EUR 110 million due to resolution of a tax dispute related to discontinued operations.

(2) The utilization of restructuring provision includes items transferred to accrued expenses, of which EUR 55 million remained in accrued expenses as of December 31, 2018 (EUR 56 million in 2017).

As of December 31, 2018, the restructuring provision amounted to EUR 493 million including personnel and other restructuring related costs, such as real estate exit costs. The provision consists of EUR 427 million global provision related to the announcement on April 6, 2016 and EUR 66 million relating to the restructuring provisions recognized

due to previously announced restructuring programs. The majority of the restructuring-related cash outflows is expected to occur over the next two years.

The warranty provision relates to sold products. Cash outflows related to the warranty provision are generally expected to occur within the next 18 months.

The litigation provision includes estimated potential future settlements for litigation. Cash outflows related to the litigation provision are inherently uncertain and generally occur over several periods.

The environmental provision includes estimated costs to sufficiently clean and refurbish contaminated sites, to the extent necessary, and where necessary, continuing surveillance at sites where the environmental remediation exposure is less significant. Cash outflows related to the environmental liability are inherently uncertain and generally occur over several periods.

The project loss provision relates to onerous customer contracts. Cash outflows related to the project loss provision are generally expected to occur over the next 12 months.

The divestment-related provision relates to the sale of businesses, and includes certain liabilities where the Group is required to indemnify the buyer. Cash outflows related to the divestment-related provision are inherently uncertain.

The material liability provision relates to non-cancellable purchase commitments with suppliers, in excess of forecasted requirements as of each reporting date. Cash outflows related to the material liability provision are expected to occur over the next 12 months.

Other provisions include provisions for various contractual obligations, other obligations and uncertain tax positions. Cash outflows related to other provisions are generally expected to occur over the next two years.

Legal matters

A number of Group companies are and will likely continue to be subject to various legal proceedings and investigations that arise from time to time, including proceedings regarding intellectual property, product liability, sales and marketing practices, commercial disputes, employment and wrongful discharge, antitrust, securities, health and safety, environmental, tax, international trade, privacy matters and compliance. As a result, the Group may incur substantial costs that may not be covered by insurance and could affect business and reputation. While management does not expect any of these legal proceedings to have a material adverse effect on the Group's financial position, litigation is inherently unpredictable and the Group may in the future incur judgments or enter into settlements that could have a material adverse effect on the results of operations and cash flows.

Litigation and proceedings

Mass labor litigation Brazil

The Group is defending against a substantial number of labor claims in various Brazilian labor courts. Plaintiffs are former employees whose contracts were terminated after the Group exited from certain managed services contracts. The claims mainly relate to payments made under, or in connection with, the terminated labor contracts. The Group has closed the majority of the court cases through settlement or judgment. Closure of most of the remaining open cases is expected to occur within the next couple of years.

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Asbestos litigation in the United States

The Group is defending approximately 300 asbestos-related matters, at various stages of litigation. The claims are based on premises liability, products liability, and contractor liability. The claims also involve plaintiffs allegedly diagnosed with various diseases, including but not limited to asbestosis, lung cancer, and mesothelioma.

30. Commitments and contingencies

Contractual obligations

Payments due for contractual obligations as of December 31, 2018 by due date:

EURm	Within 1 year	1 to 3 years	4 to 5 years	More than 5 years	Total
Purchase obligations(1)	2 837	357	41	13	3 248
Operating leases(2)	270	319	207	303	1 099
Total	3 107	676	248	316	4 347

(1) Includes inventory purchase obligations, service agreements and outsourcing arrangements.

(2) Includes leasing costs for office, manufacturing and warehouse space under various non-cancellable operating leases. Leasing obligations include EUR 217 million related to properties that are not yet available for use by the Group as of December 31, 2018.

Guarantees and other contingent commitments

EURm	2018	2017
Collateral for own commitments		
Assets pledged	–	5
Contingent liabilities on behalf of Group companies(1)		
Guarantees issued by financial institutions	1 570	1 678
Other guarantees	505	487
Contingent liabilities on behalf of other companies		
Other guarantees	25	27
Financing commitments		
Customer finance commitments(2)	313	495
Financing commitments to associated companies	20	20
Venture fund commitments(3)	314	396

(1) In contingent liabilities on behalf of Group companies, the Group reports guarantees that have been given to third parties in the normal course of business. These are mainly guarantees given by financial institutions to the Group's customers for the performance of the Group's obligations under supply agreements, including tender bonds, performance bonds, and warranty bonds issued by financial institutions on behalf of the Group. Additionally, the Group has issued corporate guarantees with primary obligation given directly to customers with these guarantees amounting to EUR 1 041 million (EUR 1 114 million in 2017). In Other guarantees, the Group reports guarantees related to non-commercial contracts that support business activities. As a result of internal policies and active management of outstanding guarantee exposure, the Group has not been subject to any material guarantee claims during recent years.

(2) Customer finance commitments are available under loan facilities negotiated with customers. Availability of the facility is dependent upon the borrower's continuing compliance with the agreed financial and operational

covenants, and compliance with other administrative terms of the facility. The loan facilities are primarily available to fund capital expenditure relating to purchases of network infrastructure equipment and services. Refer to Note 36, Financial risk management.

- (3) As a limited partner in Nokia Growth Partners and certain other funds making technology-related investments, the Group is committed to capital contributions and entitled to cash distributions according to the respective partnership agreements and underlying fund activities.

The amounts represent the maximum principal amount for commitments and contingencies.

31. Notes to the consolidated statement of cash flows

EURm	2018	2017	2016
Adjustments for(1)			
Depreciation and amortization	1 455	1 591	1 594
Share-based payment	68	92	113
Impairment charges	55	244	125
Restructuring charges(2)	238	522	751
Profit on sale of property, plant and equipment and non-current financial investments	(60)	(121)	(82)
Share of results of associated companies and joint ventures (Note 34)	(12)	(11)	(18)
Financial income and expenses	232	402	308
Income tax expense/(benefit)	64	937	(429)
Loss/(gain) on the sale of businesses	24	(5)	(14)
Other income and expenses	29	25	39
Total	2 093	3 676	2 387

(1) Includes Continuing and Discontinued operations. Refer to Note 7, Discontinued operations.

(2) Adjustments represent the non-cash portion of the restructuring charges recognized in the consolidated income statement.

The Group did not engage in any material non-cash investing or financing activities in 2018 and 2017. In 2016, the purchase consideration in relation to the acquisition of Alcatel Lucent comprised the issuance of new Nokia shares in addition to cash payments.

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32. Principal Group companies

The Group's significant subsidiaries as of December 31, 2018:

Company name	Country of incorporation	Parent holding %	Group ownership interest %
Nokia Solutions and Networks B.V.	Netherlands	–	100.0
Nokia Solutions and Networks Oy	Finland	100.0	100.0
Nokia of America Corporation	USA	–	100.0
Nokia Solutions and Networks India Private Limited	India	–	100.0
Nokia Technologies Oy	Finland	100.0	100.0
Alcatel-Lucent Participations SA	France	–	100.0
Nokia Canada Inc.	Canada	–	100.0
Nokia Shanghai Bell Co., Ltd(1)	China	–	50.0
Nokia Solutions and Networks Branch Operations Oy	Finland	–	100.0
Nokia Solutions and Networks Japan G.K.	Japan	–	100.0
Alcatel Submarine Networks SAS	France	–	100.0
Nokia Spain, S.A.	Spain	–	100.0
Alcatel-Lucent Italia S.p.A.(2)	Italy	–	100.0
Alcatel Lucent SAS	France	–	100.0
Nokia UK Limited	UK	–	100.0
Nokia Solutions and Networks GmbH & Co. KG	Germany	–	100.0
Alcatel-Lucent International SA	France	–	100.0
Nokia Services Limited	Australia	–	100.0
PT Nokia Solutions and Networks Indonesia	Indonesia	–	100.0
Alcatel-Lucent Brasil Telecomunicações Ltda	Brazil	–	100.0
Nokia Solutions and Networks do Brasil Telecomunicações Ltda.	Brazil	–	100.0

(1) Nokia Shanghai Bell Co., Ltd is the parent company of the Nokia Shanghai Bell joint venture of which the Group owns 50% plus one share with China Huaxin, an entity controlled by the Chinese government, holding the remaining ownership interests. Refer to Note 33, Significant partly-owned subsidiaries.

(2) Alcatel-Lucent Italia S.p.A. merged into Nokia Solutions and Networks Italia S.p.A., effective January 1, 2019.

33. Significant partly-owned subsidiaries

As part of the acquisition of Alcatel Lucent on January 4, 2016, the Group acquired a partly-owned consolidated subsidiary, Alcatel-Lucent Shanghai Bell Co., Ltd. On May 18, 2017, the Group announced the signing of definitive agreements with the China Huaxin Post & Telecommunication Economy Development Center (China Huaxin) related to the integration of Alcatel-Lucent Shanghai Bell Co., Ltd. and the Group's China business into a new joint venture branded as Nokia Shanghai Bell.

As part of the definitive agreements, the Group transferred its China business and subsidiaries to Nokia Shanghai Bell in exchange for a cash payment. As the transfer of the Group's China business consisted of a transaction between two Group subsidiaries, all gains or losses that arose from the transaction were fully eliminated within the Group's consolidated financial statements. Further, the transfer of cash from Nokia Shanghai Bell to the wholly-owned parent entity of the Group's China business did not impact the cash nor net cash balances in the Group's consolidated financial statements.

On July 3, 2017, the Group and China Huaxin commenced operations of the new Nokia Shanghai Bell joint venture. The Group holds an ownership interest of 50% plus one share in the Nokia Shanghai Bell's parent company, Nokia Shanghai Bell Co., Ltd., with China Huaxin holding the remaining ownership interests. The definitive agreements provide China Huaxin with the right to fully transfer its ownership interest in Nokia Shanghai Bell to the Group and the Group with the right to purchase China Huaxin's ownership interest in Nokia Shanghai Bell in exchange for a future cash settlement. As a result, the Group derecognized the non-controlling interest balance related to Nokia Shanghai Bell of EUR 772 million partly offset by the recognition of a related financial liability of EUR 737 million with the difference of EUR 35 million recorded as a gain within retained earnings as a transaction with the non-controlling interest.

The financial liability is measured based on the present value of the expected future cash settlement to acquire the non-controlling interest in Nokia Shanghai Bell. In 2018, the net present value of the expected future cash settlement amounted to EUR 693 million (EUR 672 million in 2017) and an interest expense of EUR 39 million (EUR 18 million in 2017) was recorded to reflect the recognition of the present value discount on the financial liability. In addition, the Group decreased the value of the financial liability to reflect a change in estimate of the future cash settlement resulting in the recognition of a EUR 6 million gain (EUR 64 million in 2017) in financial income and expenses in the consolidated income statement. In 2018, the Group reclassified the financial liability from non-current liabilities to current liabilities which is in line with the option exercise period.

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Financial information for the Nokia Shanghai Bell Group(1):

EURm	2018	2017
Summarized income statement		
Net sales(2)	2 518	2 276
Operating profit	54	83
Profit for the year	25	52
Profit for the year attributable to:		
Equity holders of the parent	25	15
Non-controlling interests(3)	–	37
Summarized statement of financial position		
Non-current assets	600	589
Non-current liabilities	(127)	(130)
Non-current net assets	473	459
Current assets(4)	3 340	3 888
Current liabilities	(2 209)	(2 765)
Current net assets	1 131	1 123
Net assets(5)	1 604	1 582
Non-controlling interests(6)	–	–
Summarized statement of cash flows		
Net (used in)/from operating activities	(103)	438
Net cash used in investing activities	(92)	(184)
Net cash used in financing activities	(63)	(442)
Net decrease in cash and cash equivalents	(258)	(188)

- (1) Financial information for the Nokia Shanghai Bell Group is presented before eliminations of intercompany transactions with the rest of the Group but after eliminations of intercompany transactions between entities within the Nokia Shanghai Bell Group.
- (2) Includes EUR 268 million (EUR 328 million in 2017) net sales to other Group entities.
- (3) In 2017, profit for the year is attributed to non-controlling interests until July 3, 2017.
- (4) Includes a total of EUR 738 million (EUR 1 001 million in 2017) of cash and cash equivalents and current financial investments.
- (5) The distribution of the profits of Nokia Shanghai Bell Co., Ltd requires the passing of a special resolution by more than two-thirds of its shareholders, subject to a requirement that at least 50% of the after-tax distributable profits are distributed as dividends each year.
- (6) In 2017, the non-controlling interest balance was derecognized and partially offset by the recognition of the related financial liability of EUR 737 million.

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34. Investments in associated companies and joint ventures

EURm	2018	2017
Net carrying amount as of January 1	128	116
Translation differences	4	(8)
Acquisitions through business combinations	–	1
Additions	2	9
Share of results	12	11
Dividends	(1)	(1)
Net carrying amount as of December 31	145	128

Shareholdings in associated companies and joint ventures comprise investments in unlisted companies.

35. Related party transactions

The Group has related party transactions with pension funds, associated companies, joint ventures and other entities where the Group has significant influence, as well as the management and the Board of Directors. Transactions and balances with companies over which the Group exercises control are eliminated on consolidation. Refer to Note 2, Significant accounting policies, and Note 32, Principal Group companies.

Transactions with pension funds

The Group has borrowings of EUR 69 million (EUR 69 million in 2017) from Nokia Unterstützungsgesellschaft mbH, the Group's German pension fund, a separate legal entity. The loan bears interest at the rate of 6% per annum and its duration is pending until further notice by the loan counterparties even though they have the right to terminate the loan with a 90 day notice. The loan is included in short-term interest-bearing liabilities in the consolidated statement of financial position. For more information on the Group's pension plans refer to Note 27, Pensions and other post-employment benefits.

Other entities where the Group has significant influence

In addition to associated companies and joint ventures, the Group has determined that it exercises significant influence over HMD global Oy (HMD) despite holding no voting power in it. In 2016, the Group engaged in a strategic agreement covering branding rights and intellectual property licensing to grant HMD an exclusive global license to create Nokia-branded mobile phones and tablets for ten years. Under the agreement, Nokia Technologies receives royalty payments from HMD for sales of Nokia-branded mobile products, covering both brand and intellectual property rights. The Board of Directors of HMD includes a representative from Nokia.

Transactions with associated companies, joint ventures and other entities where the Group has significant influence

EURm	2018	2017	2016
Share of results	12	11	18
Dividend income	1	1	1
Share of shareholders' equity	145	128	116
Sales	167	117	62
Purchases	(159)	(252)	(322)
Receivables	58	41	13
Payables	(32)	(19)	(38)

The Group has financial commitments of EUR 20 million (guaranteed a loan of EUR 20 million in 2017) for an associated company.

Management compensation

Compensation information for the President and CEO:

EUR	2018	2017	2016
Base salary/fee	1 050 000	1 050 000	1 049 044
Cash incentive payments	873 862	997 369	780 357
Share-based payment expenses(1)	1 978 268	2 606 613	5 296 960
Pension expenses	312 607	338 787	469 737
Total	4 214 737	4 992 769	7 596 098

(1) Represents the expense for all outstanding equity grants recorded during the year.

Total remuneration awarded to the Group Leadership Team for their time as members of the Group Leadership Team:

EURm	2018	2017	2016
Short-term benefits	23	22	26
Post-employment benefits(1)	1	1	1
Share-based payment	6	7	15
Termination benefits(2)	5	4	1
Total	35	34	43

(1) The members of the Group Leadership Team participate in the local retirement programs applicable to employees in the country where they reside.

(2) Includes both termination payments and payments made under exceptional contractual arrangements for lapsed equity awards.

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Board of Directors' compensation

The annual remuneration paid to the members of the Board of Directors, as decided by the Annual General Meetings in the respective years:

	2018		2017		2016	
	Gross annual fee(1) EUR	Shares received(2) number	Gross annual fee(1) EUR	Shares received(2) number	Gross annual fee(1) EUR	Shares received(2) number
Risto Siilasmaa, Chair	440 000	34 749	440 000	30 497	440 000	35 001
Olivier Piou, Vice Chair(3)	196 000	14 610	199 000	12 823	255 082	19 892
Vivek Badrinath	–	–	–	–	175 000	13 921
Sari Baldauf(4)	160 000	12 636	–	–	–	–
Bruce Brown(5)	214 000	15 005	209 000	13 169	190 000	15 114
Jeanette Horan(6)	195 000	13 820	175 000	12 129	–	–
Louis R. Hughes(7)	199 000	13 820	194 000	12 129	240 410	18 752
Edward Kozel(8)	217 000	15 400	175 000	12 129	–	–
Jean C. Monty(9)	14 000	–	174 000	11 090	225 410	17 558
Elizabeth Nelson(10)	192 000	13 820	207 000	13 169	190 000	15 114
Carla Smits-Nusteling(11)	206 000	15 005	195 000	12 129	175 000	13 921
Kari Stadigh(12)	170 000	12 636	170 000	11 090	160 000	12 727
Total	2 203 000		2 138 000		2 050 902	

(1) The meeting fees for the term that ended at the close of the Annual General meeting in 2018 were paid in cash in 2018 and are included in the table. The meeting fees for the current term as resolved by the Annual General Meeting in 2018 will be paid in cash in 2019 and are not included in the table.

(2) Approximately 40% of each Board member's annual compensation is paid in Nokia shares purchased from the market, and the remaining approximately 60% is paid in cash.

(3) Consists of EUR 185 000 for services as Vice Chair of the Board and meeting fees of EUR 11 000.

(4) Consists of EUR 160 000 for services as a member of the Board.

(5) Consists of EUR 160 000 for services as a member of the Board and EUR 30 000 for services as the Chair of the Personnel Committee and meeting fees of EUR 24 000.

(6) Consists of EUR 160 000 for services as a member of the Board and EUR 15 000 for services as member of the Audit Committee and meeting fees of EUR 20 000.

(7) Consists of EUR 160 000 for services as a member of the Board and EUR 15 000 for services as member of the Audit Committee and meeting fees of EUR 24 000.

(8) Consists of EUR 160 000 for services as a member of the Board and EUR 20 000 for services as the Chair of the Technology Committee, EUR 15 000 for services as a member of the Audit Committee, and meeting fees of EUR 22 000.

(9) Served as a member of the Board until the Annual General Meeting 2018. No annual fee was paid to him during financial year 2018, but he received the annual fee for the term until the Annual General Meeting 2018 in the financial year 2017 including meeting fees of EUR 14 000.

(10) Consists of EUR 160 000 for services as a member of the Board and EUR 15 000 for services as member of the Audit Committee and meeting fees of EUR 17 000.

- (11) Consists of EUR 160 000 for services as a member of the Board and EUR 30 000 for services as a Chair of the Audit Committee and meeting fees of EUR 16 000.
- (12) Consists of EUR 160 000 for services as a member of the Board and meeting fees of EUR 10 000.

Transactions with the Group Leadership Team and the Board of Directors

No loans were granted to the members of the Group Leadership Team and the Board of Directors in 2018, 2017 or 2016.

Terms of termination of employment of the President and CEO

The President and CEO, Rajeev Suri, may terminate his service contract at any time with six months' prior notice. The Group may terminate his service contract for reasons other than cause at any time with an 18 months' notice period. If there is a change of control event as defined in Mr. Suri's service contract and the service contract is terminated either by the Group or its successor without cause, or by him for "good reason", he would be entitled to a severance payment equaling up to 18 months of compensation and cash payment of the pro-rated value of his outstanding unvested equity awards, if he is dismissed within 18 months of the change in control event.

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36. Financial risk management

General risk management principles

The Group has a systematic and structured approach to risk management across business operations and processes. Key risks and opportunities are identified primarily against business targets either in business operations or as an integral part of financial planning. Key risks and opportunities are analyzed, managed, monitored and identified as part of business performance management with the support of risk management personnel. The Group's overall risk management concept is based on managing the key risks that would prevent the Group from meeting its objectives, rather than solely focusing on eliminating risks. The principles documented in the Nokia Enterprise Risk Management Policy, approved by the Audit Committee of the Board of Directors, require risk management and its elements to be integrated into key processes. One of the main principles is that the business or function head is also the risk owner, although all employees are responsible for identifying, analyzing and managing risks as appropriate to their roles and duties. Risk management covers strategic, operational, financial and hazard risks. Key risks and opportunities are reviewed by the Group Leadership Team and the Board of Directors in order to create visibility on business risks as well as to enable prioritization of risk management activities. In addition to the principles defined in the Nokia Enterprise Risk Management Policy, specific risk management implementation, including financial risk management, is reflected in other key policies and operating procedures.

Financial risks

The objective for treasury activities is to guarantee sufficient funding at all times and to identify, evaluate and manage financial risks. Treasury activities support this aim by mitigating the adverse effects on the profitability of the underlying business caused by fluctuations in the financial markets, and by managing the capital structure by balancing the levels of liquid assets and financial borrowings. Treasury activities are governed by the Nokia Treasury Policy approved by the Group President and CEO which provides principles for overall financial risk management and determines the allocation of responsibilities for financial risk management activities. Operating procedures approved by the Group CFO cover specific areas such as foreign exchange risk, interest rate risk, credit risk and liquidity risk as well as the use of derivative financial instruments in managing these risks. The Group is risk averse in its treasury activities.

Financial risks are divided into market risk covering foreign exchange risk, interest rate risk and equity price risk; credit risk covering business-related credit risk and financial credit risk; and liquidity risk.

Market risk

Foreign exchange risk

The Group operates globally and is exposed to transaction and translation foreign exchange risks. The objective of foreign exchange risk management is to mitigate adverse impacts from foreign exchange fluctuations on the Group profitability and cash flows. Treasury applies global portfolio approach to manage foreign exchange risks within approved guidelines and limits.

Transaction risk arises from foreign currency denominated assets and liabilities together with foreign currency denominated future cash flows. Transaction exposures are managed in the context of various functional currencies of Group companies. Material transactional foreign exchange exposures are hedged, unless hedging would be uneconomical due to market liquidity and/or hedging cost. Exposures are defined using transaction nominal values. Exposures are mainly hedged with derivative financial instruments, such as foreign exchange forward contracts and foreign exchange options with most of the hedging instruments having a duration of less than a year.

Layered hedging approach is typically used for hedging of highly probable forecast foreign currency denominated cash flows with quarterly hedged items defined based on set hedge ratio ranges for each successive quarter. Hedged items defined for successive quarters are hedged with foreign exchange forward contracts and foreign exchange options with a hedge ratio of 1:1. Hedging levels are adjusted on a monthly basis including hedging instrument designation and documentation as appropriate. In case hedges exceed the hedge ratio range for any specific quarter, the hedge portfolio for that specific quarter is adjusted accordingly.

In certain cases, mainly related to long-term construction projects, the Group applies fair value hedge accounting for foreign exchange risk with the objective to reduce the exposure to fluctuations in the fair value of the related firm commitments due to changes in foreign exchange rates. Exposures are mainly hedged with foreign exchange forward contracts with most of the hedging instruments having a duration of less than a year. The Group continuously manages the portfolio of hedging instruments to ensure appropriate alignment with the portfolio of hedged items at a hedging ratio of 1:1.

As the Group has entities where the functional currency is other than the euro, the shareholders' equity is exposed to fluctuations in foreign exchange rates. Changes in shareholders' equity caused by movements in foreign exchange rates are shown as currency translation differences in the consolidated financial statements. The risk management strategy is to protect the euro counter value of the portion of this exposure expected to materialize as foreign currency repatriation cash flows in the foreseeable future. Exposures are mainly hedged with derivative financial instruments, such as foreign exchange forward contracts and foreign exchange options with most of the hedging instruments having a duration of less than a year.

Hedged items are defined based on conservative expectations of repatriation cash flows based on a range of considerations. Net investment exposures are reviewed, hedged items designated, and hedging levels adjusted at minimum on a quarterly basis with a hedge ratio of 1:1. Additionally, hedging levels are adjusted whenever there are significant events impacting expected repatriation cash flows.

The foreign exchange risk arising from foreign currency denominated interest-bearing liabilities is primarily hedged using cross currency swaps that are also used to manage the Group's interest rate profile (see interest rate risk section below).

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Notional amounts in currencies that represent a significant portion of the currency mix in outstanding financial instruments and other hedged items as of December 31 are as follows:

EURm	USD	GBP	CNY	INR
2018				
Foreign exchange derivatives used as cash flow hedges, net(1)	(952)	(374)	–	–
Foreign exchange exposure designated as hedged item for cash flow hedging, net(1)	952	374		
Foreign exchange derivatives used as fair value hedges for FX risk, net(2)	(314)	93	–	–
Foreign exchange exposure designated as hedged item for fair value hedging for FX risk, net(2)	314	(93)		
Foreign exchange derivatives used as net investment hedges, net(3)	(2 486)	(61)	(944)	(544)
Foreign exchange exposure designated as hedged item for net investment hedging, net(3)	2 486	61	944	544
Foreign exchange derivatives used as hedges for interest bearing-liabilities, net	1 804	–	–	–
Foreign exchange exposure from interest-bearing liabilities, net	(1 800)	–	–	–
Other foreign exchange derivatives, carried at fair value through profit and loss, net(4)	1 690	102	886	596
Foreign exchange exposure from items on the statement of financial position, excluding interest-bearing liabilities, net	(2 446)	(63)	(978)	(299)
2017				
Foreign exchange derivatives used as cash flow hedges, net(1)	(803)	(106)	–	–
Foreign exchange derivatives used as fair value hedges, net(2)	(84)	(1)	–	–
Foreign exchange derivatives used as net investment hedges, net(3)	(2 839)	(10)	(728)	(403)
Foreign exchange exposure from statement of financial position items, net	(3 365)	(31)	(765)	(352)
Foreign exchange derivatives not designated in a hedge relationship, carried at fair value through profit and loss, net(4)	1 777	(25)	577	446
Cross-currency/interest rate hedges	1 377	–	–	–

- (1) Used to hedge the foreign exchange risk from forecasted highly probable cash flows related to sales, purchases and business acquisition activities. In some currencies, especially the U.S. dollar, the Group has substantial foreign exchange risks in both estimated cash inflows and outflows. In 2018 the underlying exposures for which these hedges are entered into are included to the table due to the adoption of IFRS 9. In 2017 the underlying exposures were not presented in the table as they are not financial instruments.
- (2) Used to hedge foreign exchange risk from contractual firm commitments. In 2018 the underlying exposures for which these hedges are entered into are included in the table due to the adoption of IFRS 9. In 2017 the underlying exposures were not presented in the table as they are not financial instruments.
- (3) Used to hedge net investment exposure. In 2018 the underlying exposures for which these hedges are entered into are included in the table due to the adoption of IFRS 9. In 2017 the underlying exposures were not presented in the table as they are not financial instruments.
- (4) Items on the statement of financial position and some probable forecasted cash flows denominated in foreign currencies are hedged by a portion of foreign exchange derivatives not designated in a hedge relationship and carried at fair value through profit and loss.

The methodology for assessing foreign exchange risk exposures: Value-at-Risk

The Group uses the Value-at-Risk (VaR) methodology to assess exposures to foreign exchange risks. The VaR-based methodology provides estimates of potential fair value losses in market risk-sensitive instruments as a result of adverse changes in specified market factors, at a specified confidence level over a defined holding period. The Group calculates the foreign exchange VaR using the Monte Carlo method which simulates random values for exchange rates in which the Group has exposures and takes the non-linear price function of certain derivative instruments into account. The VaR is determined using volatilities and correlations of rates and prices estimated from a sample of historical market data, at a 95% confidence level, using a one-month holding period. To put more weight on recent market conditions, an exponentially weighted moving average is performed on the data with an appropriate decay factor. This model implies that within a one-month period, the potential loss will not exceed the VaR estimate in 95% of possible outcomes. In the remaining 5% of possible outcomes the potential loss will be at minimum equal to the VaR figure and, on average, substantially higher. The VaR methodology relies on a number of assumptions which include the following: risks are measured under average market conditions, changes in market risk factors follow normal distributions, future movements in market risk factors are in line with estimated parameters and the assessed exposures do not change during the holding period. Thus, it is possible that, for any given month, the potential losses at a 95% confidence level are different and could be substantially higher than the estimated VaR.

The VaR figures for the Group's financial instruments which are sensitive to foreign exchange risks are presented in the table below. The VaR calculation includes foreign currency denominated monetary financial instruments, such as current financial investments, loans and trade receivables, cash, loans and trade payables; foreign exchange derivatives carried at fair value through profit and loss which are not in a hedge relationship and are mostly used to hedge the statement of financial position foreign exchange exposure; and foreign exchange derivatives designated as forecasted cash flow hedges, fair value hedges and net investment hedges as well as the exposures designated as hedged items for these hedge relationships.

	2018				2017			
	Total VaR	Impact on profit	Impact on OCI	Impact on CTA	Total VaR	Impact on profit	Impact on OCI	Impact on CTA
EURm								
As of December 31	16	21	33	6	22	13	30	–
Average for the year	14	18	38	5	14	26	46	–
Range for the year	5-24	7-27	25-58	0-8	5-24	12-64	30-55	0-5

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Interest rate risk

The Group is exposed to interest rate risk either through market value fluctuations of items on the consolidated statement of financial position (price risk) or through changes in interest income or expenses (refinancing or reinvestment risk). Interest rate risk mainly arises through interest-bearing liabilities and assets. Estimated future changes in cash flows and the structure of the consolidated statement of financial position also expose the Group to interest rate risk.

The objective of interest rate risk management is to mitigate adverse impacts arising from interest rate fluctuations on the consolidated income statement, cash flow, and financial assets and liabilities while taking into consideration the Group's target capital structure and the resulting net interest rate exposure. The Group has entered into long-term borrowings mainly at fixed rates and swapped a portion of them into floating rates, in line with a defined target interest profile. The Group has not entered into interest rate swaps where it would be paying fixed rates. The Group aims to mitigate the adverse impacts from interest rate fluctuations by continuously managing net interest rate exposure arising from financial assets and liabilities, by setting appropriate risk management benchmarks and risk limits.

Interest rate profile of interest-bearing assets and liabilities as of December 31:

EURm	2018		2017	
	Fixed rate	Floating rate(1)	Fixed rate	Floating rate(1)
Other financial assets(2)	143	68	117	73
Current financial investments	145	466	196	715
Cash and cash equivalents	497	5 765	576	6 793
Interest-bearing liabilities	(3 614)	(208)	(3 637)	(57)
Financial assets and liabilities before derivatives	(2 829)	6 091	(2 748)	7 524
Interest rate derivatives	2 332	(2 332)	1 371	(1 371)
Financial assets and liabilities after derivatives	(497)	3 759	(1 377)	6 153

(1) All cash equivalents and credit support-related liabilities with initial maturity of three months or less are considered floating rate for the purposes of interest rate risk management.

(2) Other financial assets include interest-bearing customer and vendor financing related loan receivables as well as certain other long-term interest-bearing loan receivables that have been presented in other non-current financial assets and other financial assets in the consolidated statement of financial position.

Treasury monitors and manages interest rate exposure centrally. The Group uses selective sensitivity analyses to assess and measure interest rate exposure arising from interest-bearing assets, interest-bearing liabilities and related derivatives. Sensitivity analysis determines an estimate of potential fair value changes in market risk-sensitive instruments by varying interest rates in currencies in which the Group has material amounts of financial assets and liabilities while keeping all other variables constant. The Group's sensitivity to interest rate exposure in the investment and debt portfolios is presented in the table below. Sensitivities to credit spreads are not reflected in the numbers.

EURm	2018			2017		
	Impact on fair value	Impact on profit	Impact on OCI	Impact on fair value	Impact on profit	Impact on OCI
Interest rates – increase by 100 basis points	34 (17)	3 (1)	4 (2)	126 (67)	2 (1)	(1) –

Interest rates – decrease by 50 basis points

Effects of hedge accounting on the financial position and performance

The Group is using several types of hedge accounting programs to manage its foreign exchange and interest rate risk exposures. The effect of these programs on the Group's financial position and performance as of December 31 are outlined below:

EURm	Cash flow hedges (FX forwards and options)(1)	Net investment hedges (FX forwards and options)(1)	Fair value hedges (FX forwards)(1)	Fair value and cash flow hedges (IR swaps and cross currency swaps)(1)
Carrying amount of hedges	(13)	(11)	(4)	(46)
Notional amount of hedges	(1 451)	(4 129)	(226)	2 330
Notional amount of hedged items	1 451	4 129	231	(2 330)
Change in intrinsic value of hedging instruments since 1 January	(44)	(83)	(13)	9
Change in value of hedged items used to determine hedge effectiveness	45	83	17	(7)

(1) No significant ineffectiveness has been recorded during 2018 and economic relationships have been fully effective

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The most significant foreign exchange hedging instruments under cash flow, net investment and fair value hedge accounting as of December 31 are outlined in the table below:

	Currency	Instrument	Fair value (EURm)	Weighted average hedged rate	Maturity breakdown of net notional amounts (EURm)(1)			
					Total	Within 3 months	Between 3 and 12 months	Beyond 1 year
Cash flow hedge accounting								
		FX						
	GBP	Forwards	3	0.8866	(184)	(38)	(93)	(53)
	GBP	FX Options	7	0.9064	(191)	(48)	(90)	(53)
		FX						
	JPY	Forwards	(4)	130.0618	(150)	(51)	(99)	–
		FX						
	PLN	Forwards	1	4.2966	149	46	102	–
		FX						
	USD	Forwards	(19)	1.1653	(655)	(140)	(515)	–
	USD	FX Options	2	1.2029	(297)	(87)	(210)	–
Net investment hedge accounting								
		FX						
	CNY	Forwards	4	7.8333	(944)	(944)	–	–
		FX						
	INR	Forwards	(15)	81.5362	(544)	(544)	–	–
		FX			(2)			
	USD	Forwards	(2)	1.1414	246	(2 246)	–	–
	USD	FX Options	1	1.1703	(240)	(240)	–	–
Fair value hedge accounting for FX risk								
		FX						
	USD	Forwards	(3)	1.1478	(314)	(378)	64	–

(1) Negative notional amounts indicate that hedges sell currency and positive notional amounts indicate that hedges buy currency.

For information on hedging instruments used for fair value and cash flow hedge accounting related to the Group's interest-bearing liabilities, refer to Note 23, Interest-bearing liabilities.

Equity price risk

In 2018 and 2017, the Group did not have exposure to equity price risk from publicly listed equity shares as it does not have significant investments. The private funds where the Group has investments are investing primarily in private equity and may, from time to time, have investments also in public equity. Such investments have not been included

in this disclosure.

Other market risk

In certain emerging market countries there are local exchange control regulations that provide for restrictions on making cross-border transfers of funds as well as other regulations that impact the Group's ability to control its net assets in those countries.

Credit risk

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Group. Credit risk arises from credit exposures to customers, including outstanding receivables, financial guarantees and committed transactions, as well as financial institutions, including bank and cash, fixed income and money-market investments, and derivative financial instruments. Credit risk is managed separately for business-related and financial credit exposures.

Business-related credit risk

The Group aims to ensure the highest possible quality in trade receivables and contract assets as well as customer or third-party loan receivables. The Credit Risk Management Standard Operating Procedure, approved by the Group CFO, lays out the framework for the management of the business-related credit risks. The Credit Risk Management Standard Operating Procedure sets out that credit decisions are based on credit evaluation in each business, including credit rating and limits for larger exposures, according to defined principles. Group level limit approvals are required for material credit exposures. Credit risks are monitored in each business and, where appropriate, mitigated on case by case basis with the use of letters of credit, collaterals, sponsor guarantees, credit insurance, and sale of selected receivables.

Upon adoption of IFRS 9, the Group applies a simplified approach to recognizing a loss allowance on trade receivables based on measurement of lifetime expected credit losses arising from trade receivables without significant financing components. Based on quantitative and qualitative analysis, the Group has determined that the credit risk exposure arising from its trade receivables is low risk. Quantitative analysis focuses on historical loss rates, historic and projected sales and the corresponding trade receivables, and overdue trade receivables including indicators of any deterioration in the recovery expectation. Qualitative analysis focuses on all relevant conditions, including customer credit rating, country credit rating and political situation, to improve the accuracy of estimating lifetime expected credit losses. In 2018 and 2017, the Group recognized impairment losses of less than 1% of Net sales.

Credit exposure is measured as the total of trade receivables, contract assets and loans outstanding from customers and committed credits. Trade receivables do not include any major concentrations of credit risk by customer. The top three customers account for approximately 4.2%, 3.7% and 3.5% (4.3%, 3.8% and 2.6% in 2017) of trade receivables, contract assets and loans due from customers and other third parties as of

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December 31, 2018. The top three credit exposures by country account for approximately 16.2%, 11.0% and 7.9% (17.4%, 13.4% and 5.3% in 2017) of the Group's trade receivables, contract assets and loans due from customers and other third parties as of December 31, 2018. The 16.2% credit exposure relates to trade receivables in China (17.4% in 2017).

The Group has provided loss allowances on trade receivables, contract assets and loans due from customers and other third parties not past due based on an analysis of debtors' credit ratings and credit histories. The Group establishes loss allowances that represent an estimate of expected losses at the end of the reporting period. All trade receivables, contract assets and loans due from customers are considered on an individual basis to determine the loss allowances. The total of trade receivables, contract assets and loans due from customers is EUR 7 112 million (EUR 7 232 million in 2017) as of December 31, 2018.

The aging of trade receivables, contract assets and customer finance loans is as follows:

EURm	Current	Past due 1-30 days	Past due 31-180 days	Past due More than 180 days	Total
As of December 31, 2018					
Trade receivables	4 224	243	300	284	5 051
Contract assets(1)	1 875	–	–	–	1 875
Customer finance loans	186	–	–	–	186
Total	6 285	243	300	284	7 112
As of December 31, 2017					
Trade receivables	6 179	158	277	458	7 072
Customer finance loans	158	2	–	–	160
Total	6 337	160	277	458	7 232

(1) The Group adopted IFRS 15 on January 1, 2018, by applying the modified retrospective method, hence no comparatives for December 31, 2017.

Movements in loss allowances, all of which relate to trade receivables, for the years ended December 31:

EURm	2018	2017	2016
As of January 1	192	168	62
Charged to income statement	86	61	126
Deductions(1)	(83)	(37)	(20)
As of December 31	195	192	168

(1) Deductions include utilization and releases of allowances

The maximum exposure to credit risk for outstanding customer finance loans is limited to the book value of financial assets as included in the consolidated statement of financial position:

EURm	2018	2017
Loan commitments given undrawn	313	495
Outstanding customer finance loans	186	160
Total	499	655

For customer and vendor finance related loans, the credit loss estimate is typically based on a 12 month expected credit loss for outstanding loans and estimated additional draw-downs during this period. The loss allowance is calculated on a quarterly basis based on a review of collectability and available collateral, derecognized from other comprehensive income and recognized in other financial expenses in the consolidated income statement.

The changes in loss allowance for customer and vendor finance related loan receivables is presented below:

EURm	Loss allowance
As of December 31, 2017	–
Adoption of IFRS 9(1)	9
As of January 1, 2018	9
(Decrease)/increase during the year	(2)
As of December 31, 2018	7

(1) Initial adjustment following the adoption of IFRS 9 as a result of applying the expected credit loss model
Financial credit risk

Financial instruments contain an element of risk resulting from changes in the market price due to counterparties becoming less creditworthy or risk of loss due to counterparties being unable to meet their obligations. Financial credit risk is measured and monitored centrally by Treasury. Financial credit risk is managed actively by limiting counterparties to a sufficient number of major banks and financial institutions, and by monitoring the creditworthiness and the size of exposures continuously. Additionally, the Group enters into netting arrangements with all major counterparties, which give the right to offset in the event that the counterparty would not be able to fulfill its obligations. The Group enters into collateral agreements with certain counterparties, which require counterparties to post collateral against derivative receivables.

Investment decisions are based on strict creditworthiness and maturity criteria as defined in the Treasury-related policies and procedures. As a result of this investment policy approach and active management of outstanding investment exposures, the Group has not been subject to any

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material credit losses in its financial investments in the years presented. The Group did not have any financial investments that were past due but not impaired at December 31. Due to the high credit quality of the Group's financial investments the expected credit loss for these investments is deemed insignificant.

Breakdown of outstanding fixed income and money-market investments, cash equivalents and cash by sector and credit rating grades ranked as per Moody's rating categories as of December 31:

EURm	Rating(1)	Cash	Due within 3 months	Due between 3 and 12 months	Due between 1 and 3 years	Due between 3 and 5 years	Due beyond 5 years	Total(2)(3)(4)
2018								
Banks	Aaa	–	317	–	–	–	–	317
	Aa1-Aa3	1 210	209	3	20	–	–	1 442
	A1-A3	1 609	1 851	452	120	207	–	4 239
	Baa1-Baa3	58	228	47	–	–	–	333
	Ba1-Ba3	57	–	–	–	–	–	57
	B1-B3	25	18	–	–	–	–	43
	Caa1-Caa3	12	–	–	–	–	–	12
	Non-rated	172	10	3	–	–	–	185
Other	A1-A3	–	245	–	–	–	–	245
Total		3 143	2 878	505	140	207	–	6 873
2017								
Banks	Aaa	–	607	–	–	–	–	607
	Aa1-Aa3	1 224	398	74	69	–	–	1 765
	A1-A3	1 628	1 808	247	240	191	45	4 159
	Baa1-Baa3	483	455	232	125	–	–	1 295
	Ba1-Ba3	25	35	–	2	–	–	62
	Non-rated	126	38	–	–	–	–	164
Governments	A1-A3	11	1	2	–	–	–	14
Other	Aa1-Aa3	–	24	10	39	–	–	73
	A1-A3	–	10	53	78	–	–	141
Total		3 497	3 376	618	553	191	45	8 280

(1) Bank Parent Company ratings are used here for bank groups. In some emerging markets countries, actual bank subsidiary ratings may differ from the Parent Company rating.

(2) Fixed income and money-market investments include bank deposits, structured deposits, investments in liquidity funds and investments in fixed income instruments. Liquidity funds that invested mainly in bank securities are included under Banks and other liquidity funds are included under Other. Additionally, in 2017, liquidity funds that invested solely in government securities are included under Governments.

(3) Instruments that include a call feature have been presented at their final maturities, if any. Instruments that are contractually due beyond 3 months include EUR 472 million (EUR 701 million in 2017) of instruments that have a call period of less than 3 months.

(4) The Group has assessed credit quality of restricted financial assets of EUR 158 million (EUR 142 million in 2017) and has concluded that expected credit losses are not significant. These assets have been excluded from the table.

Financial assets and liabilities subject to offsetting under enforceable master netting agreements and similar arrangements as of December 31:

EURm	Gross amounts of financial assets/ (liabilities)	Gross amounts of financial liabilities/ (assets) set off in the statement of financial position	Net amounts of financial assets/ (liabilities) presented in the statement of financial position	Related amounts not set off in the statement of financial position		
				Financial instruments assets/(liabilities)	Cash collateral received/(pledged)	Net amount
2018						
Derivative assets	131	–	131	104	15	12
Derivative liabilities	(178)	–	(178)	(103)	(72)	(3)
Total	(47)	–	(47)	1	(57)	9
2017						
Derivative assets	197	–	197	135	38	24
Derivative liabilities	(268)	–	(268)	(145)	(100)	(23)
Total	(71)	–	(71)	(10)	(62)	1

The financial instruments subject to enforceable master netting agreements and similar arrangements are not offset in the consolidated statement of financial position where there is no intention to settle net or realize the asset and settle the liability simultaneously.

Liquidity risk

Liquidity risk is defined as financial distress or extraordinarily high financing costs arising from a shortage of liquid funds in a situation where outstanding debt needs to be refinanced or where business conditions unexpectedly deteriorate and require financing. Transactional liquidity risk is defined as the risk of executing a financial transaction below fair market value or not being able to execute the transaction at all within a specific period of time. The objective of liquidity risk management is to maintain sufficient liquidity, and to ensure that it is readily available without endangering its value in order to avoid uncertainty related to financial distress at all times.

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The Group aims to secure sufficient liquidity at all times through efficient cash management and by investing in short-term liquid interest-bearing securities and money-market investments. Depending on its overall liquidity position, the Group may pre-finance or refinance upcoming debt maturities before contractual maturity dates. The transactional liquidity risk is minimized by entering into transactions where proper two-way quotes can be obtained from the market.

The Group aims to ensure flexibility in funding by maintaining committed and uncommitted credit lines. As of December 31, 2018 committed revolving credit facilities totaled EUR 1 579 million (EUR 1 579 million in 2017).

Issuer:	Program:	Issued
Nokia Corporation	Euro Medium-Term Note Program, totaling EUR 5 000 million	1,250

Significant current long-term funding programs as of December 31, 2018:

Issuer:	Program:	Issued
Nokia Corporation	Local commercial paper program in Finland, totaling EUR 750 million	–

The following table presents an undiscounted cash flow analysis for financial liabilities and financial assets that are presented on the consolidated statement of financial position. Contingent financial assets and liabilities are presented according to their remaining contractual maturity. The line-by-line analysis does not directly reconcile with the consolidated statement of financial position.

EURm	Total	Due within 3 months	Due between 3 and 12 months	Due between 1 and 3 years	Due between 3 and 5 years	Due beyond 5 years
2018						
Non-current financial assets						
Other non-current financial assets(1)	146	23	–	48	25	50
Current financial assets						
Current financial investments	612	231	381	–	–	–
Other current financial assets excluding derivatives(2)	97	35	62	–	–	–
Cash and cash equivalents(3)	6 271	5 796	125	142	208	–
Cash flows related to derivative financial assets net settled:						
Derivative contracts - receipts	22	3	(6)	8	8	9
Cash flows related to derivative financial assets gross settled:						
Derivative contracts – receipts	11 428	9 506	1 017	151	46	708
	(11					
Derivative contracts – payments	093)	(9 463)	(1 008)	(124)	(17)	(481)
Trade receivables	4 851	3 998	774	79	–	–
Non-current financial liabilities						
Long-term interest-bearing liabilities	(3 918)	(28)	(72)	(730)	(604)	(2 484)

Current financial liabilities						
Short-term interest-bearing liabilities	(1 024)	(470)	(554)	–	–	–
Other financial liabilities excluding derivatives	(731)	–	(731)	–	–	–
Cash flows related to derivative financial liabilities gross settled:						
Derivative contracts – receipts	12 251	9 863	1 335	68	482	503
	(12)					
Derivative contracts – payments	236)	(9 944)	(1 347)	(20)	(459)	(466)
Trade payables	(4 773)	(4 645)	(104)	(23)	–	(1)
Contingent financial assets and liabilities						
Loan commitments given undrawn(4)	(313)	(14)	(30)	(153)	(77)	(39)
Loan commitments obtained undrawn(5)	2 323	249	(3)	2 077	–	–

- (1) Other non-current financial assets include long-term customer and vendor financing related loan receivables as well as certain other long-term loan receivables that have been presented in other non-current financial assets in the consolidated statement of financial position.
- (2) Other current financial assets excluding derivatives include short-term customer and vendor financing related loan receivables that have been presented in other financial assets in the consolidated statement of financial position.
- (3) Instruments that include a call feature have been presented at their final maturities, if any. Instruments that are contractually due beyond 3 months include EUR 472 million of instruments that have a call period of less than 3 months.
- (4) Loan commitments given undrawn have been included in the earliest period in which they could be drawn or called.
- (5) Loan commitments obtained undrawn have been included based on the period in which they expire. These amounts include related commitment fees.

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EURm	Total	Due within 3 months	Due between 3 and 12 months	Due between 1 and 3 years	Due between 3 and 5 years	Due beyond 5 years
2017						
Non-current financial assets						
Long-term loan receivables	112	21	–	77	4	10
Current financial assets						
Short-term loan receivables	92	6	86	–	–	–
Current financial investments and cash equivalents(1)	4 797	3 381	621	558	192	45
Bank and cash	3 497	3 497	–	–	–	–
Cash flows related to derivative financial assets gross settled:						
Derivative contracts	11					
- receipts	484	10 249	1 235	–	–	–
Derivative contracts	(11					
- payments	330)	(10 108)	(1 222)	–	–	–
Trade receivables(2)	5 633	4 297	1 208	107	21	–
Non-current financial liabilities						
Long-term interest-bearing liabilities	(4 657)	(44)	(95)	(938)	(1 098)	(2 482)
Other long-term liabilities	(754)	–	–	(748)	–	(6)
Current financial liabilities						
Short-term interest-bearing liabilities	(313)	(215)	(98)	–	–	–
Cash flows related to derivative financial liabilities gross settled:						
Derivative contracts	10					
- receipts	278	8 265	280	573	486	674
Derivative contracts	(10					
- payments	245)	(8 366)	(243)	(568)	(467)	(601)
Trade payables	(3 996)	(3 731)	(251)	(9)	(3)	(2)

Contingent financial
assets and liabilities

Loan commitments

given undrawn(3)	(495)	(71)	(172)	(174)	(78)	–
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Loan commitments
obtained

undrawn(4)	1 566	(1)	(3)	1 570	–	–
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(1) Instruments that include a call feature have been presented at their final maturities, if any. Instruments that are contractually due beyond 3 months included EUR 701 million of instruments that have a call period of less than 3 months in 2017.

(2) Trade receivables maturity analysis did not include accrued receivables of EUR 1 247 million.

(3) Loan commitments given undrawn have been included in the earliest period in which they could be drawn or called.

(4) Loan commitments obtained undrawn have been included based on the period in which they expire. These amounts include related commitment fees.

37. Subsequent events

Non-adjusting events after the reporting period

Changes in organizational structure

The Group announced organizational changes to accelerate its strategy execution on October 25, November 22 and December 31, 2018. Starting January 1, 2019, the Group revised its financial reporting structure to better reflect its strategy, organizational structure and the way it evaluates operational performance and allocates resources. As of the first quarter 2019, the Group will have three reportable segments: (i) Networks, (ii) Nokia Software and (iii) Nokia Technologies. In addition, the Group will disclose segment-level data for Group Common and Other. For each reportable segment, the Group will provide detailed financial disclosure, including net sales and operating profit.

In addition, the Group will provide net sales disclosure for the following businesses: (i) Mobile Access, (ii) Fixed Access, (iii) IP Routing and (iv) Optical Networks, which together comprise the new Networks reportable segment. The Group will also provide separate net sales disclosure for its different customer types: (i) Communication Service Providers, (ii) Enterprises and (iii) Licensees. Net sales by region will be provided at the Group level.

Financing transactions

On February 4, 2019, the Group repaid EUR 231 million 6.75% Senior Notes in cash at the maturity.

On February 14, 2019, the availability period of EUR 250 million loan facility with the Nordic Investment Bank (NIB) was extended until August 2019.

On March 11, 2019, the Group issued a tranche of senior unsecured notes in an aggregate principal amount of EUR 750 million. The notes will mature on March 11, 2026, and have a 2.00% fixed coupon.

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Report of independent registered public accounting firm

To the Board of Directors and shareholders of Nokia Corporation

Opinions on the financial statements and internal control over financial reporting

We have audited the accompanying consolidated statement of financial position of Nokia Corporation and its subsidiaries (the Company) as of December 31, 2018 and 2017, and the related consolidated income statement, consolidated statement of comprehensive income, consolidated statement of changes in shareholders' equity and consolidated statement of cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with International Financial Reporting Standards as issued by the International Accounting Standards Board and International Financial Reporting Standards as adopted by the European Union. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Change in Accounting Principles

As discussed in Note 3 to the consolidated financial statements, the Company changed the manner in which it accounts for revenue from contracts with customers and the manner in which it accounts for financial instruments in 2018.

Basis for opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control over Financial Reporting appearing under Item 15 of the Annual Report on Form 20-F for the fiscal year ended December 31, 2018. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and

disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and limitations of internal control over financial reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers Oy

Helsinki, Finland

March 21, 2019

We have served as the Company's auditor since 1987.

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Other information

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Exhibits

- 1 Articles of Association of Nokia Corporation (incorporated by reference to Exhibit 1 of our annual report on Form 20-F filed with the Securities and Exchange Commission on March 23, 2017 (File No. 1-13202)).
- 6 Refer to Note 14, Earnings per share, of our consolidated financial statements included in this annual report on Form 20 F, for information on how earnings per share information was calculated.
- 8 Refer to Note 32, Principal Group companies, of our consolidated financial statements included in this annual report on Form 20 F, for more information on our significant subsidiaries.
- 11 Code of Ethics
- 12.1 Certification of Rajeev Suri, President and Chief Executive Officer of Nokia Corporation, Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
- 12.2 Certification of Kristian Pullola, Group Chief Financial Officer of Nokia Corporation, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
- 13 Certification, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
- 15(a) Consent of Independent Registered Public Accounting Firm.
- 101 Interactive Data Files (XBRL – Related Documents)

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Key ratios

Earnings per share (basic)

Profit attributable to equity holders of the parent

Weighted average number of shares in issue

Earnings per share (diluted)

Profit attributable to equity holders of the parent adjusted for the effect of dilution

Adjusted weighted average number of shares

P/E ratio

Closing share price as of December 31

Earnings per share (basic) for Continuing operations

Payout ratio

Dividend per share

Earnings per share (basic) for Continuing operations

Dividend yield %

Dividend per share

Closing share price as of December 31

Shareholders' equity per share

Capital and reserves attributable to equity holders of the parent

Number of shares as of December 31 - number of treasury shares as of December 31

Market capitalization

(Number of shares as of December 31 - number of treasury shares as of December 31) x closing share price as of December 31

Share turnover %

Number of shares traded during the year

Average number of shares during the year

Total cash and current financial investments

Cash and cash equivalents and current financial investments

Net cash and current financial investments

Total cash and current financial investments - interest-bearing liabilities

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Glossary of terms

3G (Third Generation Mobile Communications): The third generation of mobile communications standards designed for carrying both voice and data generally using WCDMA or close variants.

4G (Fourth Generation Mobile Communications): The fourth generation of mobile communications standards based on LTE, offering IP data connections only and providing true broadband internet access for mobile devices. Refer also to LTE.

5G (Fifth Generation Mobile Communications): The next major phase of mobile telecommunications standards. 5G will be the set of technical components and systems needed to handle new requirements and overcome the limits of current systems.

Access network: A telecommunications network between a local exchange and the subscriber station.

Airframe: Our 5G-ready, end-to-end data center solution that combines the benefits of Cloud computing technologies with the requirements of the core and radio telecommunications world. It is available in Rackmount and Open Compute Project (OCP) form factors. This enables the solution to be very scalable: from small distributed latency-optimized data centers, all the way to massive centralized hyper scale data center deployment.

AirScale Radio Access: A 5G-ready complete radio access generation that helps operators address the increasing demands of today and tomorrow. The solution comprises: Nokia AirScale Base Station with multiband RF elements and system modules; Nokia AirScale Active Antennas; Cloud RAN with Nokia AirScale Cloud Base Station Server and the Cloud-based AirScale RNC for 3G; Nokia AirScale Wi-Fi; common software; and services which use intelligent analytics and extreme automation to maximize the performance of hybrid networks.

Alcatel Lucent SA or Alcatel Lucent: Alcatel Lucent, a subsidiary of Nokia Corporation.

Bandwidth: The width of a communication channel, which affects transmission speeds over that channel.

Base station: A network element in a mobile network responsible for radio transmission and reception to or from the mobile station.

Broadband: The delivery of higher bandwidth by using transmission channels capable of supporting data rates greater than the primary rate of 9.6 Kbps.

CDMA (Code Division Multiple Access): A technique in which radio transmissions using the same frequency band are coded in a way that a signal from a certain transmitter can be received only by certain receivers.

Churn: Churn rate is a measure of the number of customers or subscribers who leave their service provider, e.g. a mobile operator, during a given time period.

Cloud: Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort.

CloudBand: Our Cloud management and orchestration solutions enabling a unified Cloud engine and platform for NFV.

Continuing operations: Refers to the Continuing operations following the acquisition of Alcatel Lucent, the sale of HERE business in 2015 and the sale of D&S business in 2014. Our Continuing operations in 2018 included two businesses: our Networks business and Nokia Technologies.

Converged Core: A business unit of our Mobile Networks business group providing solutions for the core network of the future.

Convergence: The coming together of two or more disparate disciplines or technologies. Convergence types are, for example, IP convergence, fixed-mobile convergence and device convergence.

Core network: A combination of exchanges and the basic transmission equipment that together form the basis for network services.

CSPs: Communications service providers.

Customer Experience Management: Software suite used to manage and improve the customer experience, based on customer, device and network insights.

Devices & Services: Our former mobile device business, substantially all of which was sold to Microsoft.

DevOps: An agile software engineering culture and practice that aims at unifying software development (Dev) and software operation (Ops).

Digital: A signaling technique in which a signal is encoded into digits for transmission.

Discontinued operations: Mainly refers to the divestment of our HERE business to an automotive consortium and the sale of substantially all of our Devices & Services business to Microsoft.

Ecosystem: An industry term to describe the increasingly large communities of mutually beneficial partnerships that participants such as hardware manufacturers, software providers, developers, publishers, entertainment providers, advertisers and ecommerce specialists form in order to bring their offerings to market. At the heart of the major ecosystems in the mobile devices and related services industry is the operating system and the development platform upon which services are built.

Engine: Hardware and software that perform essential core functions for telecommunication or application tasks.

ETSI (European Telecommunications Standards Institute): Standards produced by the ETSI contain technical specifications laying down the characteristics required for a telecommunications product.

Fixed Networks: Our Fixed Networks business group provides copper and fiber access products, solutions, and services.

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Future X: A network architecture - a massively distributed, cognitive, continuously adaptive, learning and optimizing network connecting humans, senses, things, systems, infrastructure, processes.

G.fast: A fixed broadband technology able to deliver up to 1Gbps over very short distances (for example, for in-building use, also called “Fiber-to-the-Building”). Launched in 2014, G.fast uses more frequencies and G.fast Vectoring techniques to achieve higher speeds.

Global Delivery Center: A remote service delivery center with a pool of services experts, automated tools and standardized processes to ensure that services across the entire network life cycle are delivered to operators globally.

Global Services: Our Global Services business group provides mobile operators with a broad range of services, including professional services, network implementation and customer care services.

GPON (Gigabit Passive Optical Networking): A fiber access technology that delivers 2.5Gbps over a single optical fiber to multiple end points including residential and enterprise sites.

GSM (Global System for Mobile Communications): A digital system for mobile communications that is based on a widely-accepted standard and typically operates in the 900 MHz, 1800 MHz and 1900 MHz frequency bands.

HERE: A former Nokia company focused on mapping and location intelligence services, which was divested to an automotive consortium in 2015.

IFRS (International Financial Reporting Standards): International Financial Reporting Standards as issued by the International Accounting Standards Board and in conformity with IFRS as adopted by the European Union.

Internet of Things (IoT): All things such as cars, the clothes we wear, household appliances and machines in factories connected to the Internet and able to automatically learn and organize themselves.

Industrial design: Design process applied for products that will be manufactured at mass scale.

Internet Protocol: A network layer protocol that offers a connectionless internet work service and forms part of the TCP/IP protocol.

IP (Intellectual Property): Intellectual property results from original creative thought, covering items such as patents, copyright material and trademarks, as well as business models and plans.

IP Multimedia Subsystem (IMS): Architectural framework designed to deliver IP-based multimedia services on telecommunications networks; standardized by 3GPP.

IPR (Intellectual Property Right): Legal right protecting the economic exploitation of intellectual property, a generic term used to describe products of human intellect, for example patents, that have an economic value.

IPR licensing: Generally refers to an agreement or an arrangement where a company allows another company to use its intellectual property (such as patents, trademarks or copyrights) under certain terms.

IP/Optical Networks: Our IP/Optical Networks business group provides the key IP routing and optical transport systems, software and services to build high capacity network infrastructure for the internet and global connectivity.

LTE (Long-Term Evolution): 3GPP radio technology evolution architecture and a standard for wireless communication of high-speed data. Also referred to as 4G, refer to 4G above.

Mobile broadband: Refers to high-speed wireless internet connections and services designed to be used from arbitrary locations.

Mobile Networks: Our Mobile Networks business group offers an industry-leading portfolio of end-to-end mobile networking solutions comprising hardware, software, and services for telecommunications operators, enterprises, and related markets/verticals such as public safety and IoT.

Networks business: Comprised the Mobile Networks, Fixed Networks, Global Services, Nokia Software, and IP/Optical Networks business groups in 2018.

NFV (Network Functions Virtualization): Principle of separating network functions from the hardware they run on by using virtual hardware abstraction.

Nokia Bell Labs: Our research arm discovering and developing the technological shifts needed for the next phase of human existence as well as exploring and solving complex problems to radically redefine networks.

Nokia Enterprise: Recognizing the growth potential of our business within the enterprise customer segment, we created a new business group, Nokia Enterprise, effective January 1, 2019. Our Enterprise business group addresses the mission- and business-critical networking requirements of asset-intensive industries such as transportation, energy, manufacturing and logistics – as well as governments and smart cities.

Nokia Networks: Our former business focused on mobile network infrastructure software, hardware and services.

Nokia Software: Our business group offering carrier-grade software applications and platforms to provide operations and business support systems, build, deliver, and optimize services, enable their monetization, and to improve customer experience.

Nokia Technologies: Our business focused on advanced technology development and licensing.

NSN (Nokia Solutions and Networks): The former name of our Networks business. From 2007, NSN was known as Nokia Siemens Networks until we acquired Siemens' 50% stake in the joint venture in 2013.

Nuage Networks: A wholly owned subsidiary of Alcatel Lucent, delivers a SDN solution to eliminate key data center network constraints that hinder Cloud services adoption.

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Operating system (OS): Software that controls the basic operation of a computer or a mobile device, such as managing the processor and memory. The term is also often used to refer more generally to the software within a device, including, for instance, the user interface.

Packet: Part of a message transmitted over a packet switched network.

Picocell: A small cellular base station typically covering a small area typically up to 200 meters wide. Typically used to extend coverage to indoor areas or to add network capacity in areas with very dense phone usage, such as train stations.

Platform: Software platform is a term used to refer to an operating system or programming environment, or a combination of the two.

PON (Passive Optical Networking): A fiber access architecture in which unpowered Fiber Optic Splitters are used to enable a single optical fiber to serve multiple end-points without having to provide individual fibers between the hub and customer.

Programmable World: A world where connectivity will expand massively, linking people as well as billions of physical objects - from cars, home appliances and smartphones, to wearables, industrial equipment and health monitors. What distinguishes the Programmable World from the Internet of Things is the intelligence that is added to data to allow people to interpret and use it, rather than just capture it.

RAN (Radio Access Network): A mobile telecommunications system consisting of radio base stations and transmission equipment.

SDAN: Software Defined Access Network.

SDN (Software Defined Networking): An approach to computer networking that decouples the network control and forwarding functions enabling the network control to become programmable and the underlying hardware to be abstracted.

SD-WAN: Software-defined networking in a wide area network (WAN). An SD-WAN simplifies the management and operation of a WAN by decoupling the networking hardware from its control mechanism.

SEPs (Standard-Essential Patents): Generally, patents needed to produce products which work on a standard, which companies declare as essential and agree to license on fair, reasonable and non-discriminatory (FRAND) terms.

Single RAN: Single RAN allows different radio technologies to be provided at the same time from a single base station, using a multi-purpose platform.

Small cells: Low-powered radio access nodes (micro cells or picocells) that are a vital element in handling very dense data traffic demands. 3G and LTE small cells use spectrum licensed by the operator; WiFi uses unlicensed spectrum which is therefore not under the operator's exclusive control.

Technology licensing: Generally refers to an agreement or arrangement where under certain terms a company provides another company with its technology and possibly know-how, whether protected by intellectual property or not, for use in products or services offered by the other company.

Telco Cloud: Applying Cloud computing, SDN and NFV principles in telecommunications environment, e.g. separating application software from underlying hardware with automated, programmable interfaces while still retaining telecommunications requirements such as high availability and low latency.

Transmission: The action of conveying signals from one point to one or more other points.

TXLEs (Technical extra-large enterprises): Technically sophisticated companies, such as banks, that invest heavily in their own network infrastructures to gain a key competitive advantage.

VDSL2 (Very High Bit Rate Digital Subscriber Line 2): A fixed broadband technology, the successor of ADSL. Launched in 2007, it typically delivers a 30Mbps broadband service from a street cabinet (also called a “Fiber-to-the-Node” deployment) over existing telephone lines.

VDSL2 Vectoring: A fixed broadband technology launched in 2011, able to deliver up to 100Mbps over a VDSL2 line by applying noise cancellation techniques to remove cross-talk between neighboring VDSL2 lines.

Virtual Reality (VR): The simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors.

VoLTE (Voice over LTE): Required to offer voice services on an all-IP LTE network and generally provided using IP Multimedia Subsystem.

Vplus: A fixed broadband technology, between VDSL2 Vectoring and G.fast in terms of bandwidth and distances, typically used in FTTN (ode) deployments. Launched in 2015, it delivers up to 300Mbps and has been standardized as VDSL2 35b.

WAN (Wide Area Networking): A geographically distributed private telecommunications network that interconnects multiple local area networks.

WCDMA (Wideband Code Division Multiple Access): A third-generation mobile wireless technology that offers high data speeds to mobile and portable wireless devices.

Webscale companies: Companies - such as Google, Microsoft, and Alibaba - which are investing in Cloud technology and network infrastructure on an increasing scale to fulfill their needs for massive, mission-critical networks.

WLAN (Wireless Local Area Network): A local area network using wireless connections, such as radio, microwave or infrared links, in place of physical cables.

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Investor information

Information on the internet

www.nokia.com

Available on the internet: financial reports, members of the Group Leadership Team, other investor-related materials and events, and press releases as well as environmental and social information, including our Sustainability Report, Code of Conduct, Corporate Governance Statement and Remuneration Statement.

SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC (<http://www.sec.gov>).

Investor Relations contacts

investor.relations@nokia.com

Annual General Meeting

Date: May 21, 2019

Place: Helsinki, Finland

Dividend

The Board proposes to the Annual General Meeting a dividend of EUR 0.20 per share for the year 2018.

Financial reporting

Our interim reports in 2019 are planned to be published on April 25, 2019, July 25, 2019 and October 24, 2019. The full-year 2019 results are planned to be published in January 2020.

Information published in 2018

All our global press releases and statements published in 2018 are available on the internet at www.nokia.com/en_int/news/releases.

Stock exchanges

The Nokia Corporation share is quoted on the following stock exchanges:

	Trading Symbol	currency
Nasdaq Helsinki (since 1915)	NOKIA	EUR
New York Stock Exchange (since 1994)	NOK	USD
Euronext Paris (since 2015)	NOKIA	EUR

Documents on display

The documents referred to in this annual report on Form 20 F can be read at the Securities and Exchange Commission's internet site at <http://www.sec.gov>.

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Signatures

The registrant hereby certifies that it meets all of the requirements for filing on Form 20 F and that it has duly caused and authorized the undersigned to sign this annual report on Form 20 F on its behalf.

Nokia Corporation

By: /S/ KRIS LEMMENS
Name: Kris Lemmens
Title: Deputy Chief Financial Officer

By: /S/ ESA NIINIMÄKI
Name: Esa Niinimäki
Title: Vice President, Corporate Legal

March 21, 2019

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