JUNIPER NETWORKS INC
Form 10-K
February 22, 2019

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K
(Mark One)
x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018
or
o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from__________ to____________

Commission file number 001-34501
JUNIPER NETWORKS, INC.
(Exact name of registrant as specified in its charter)

Delaware	77-0422528
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
1133 Innovation Way	
Sunnyvale, California	94089
(Address of principal executive offices)	(Zip code)

(408) 745-2000
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, par value $0.00001 per share	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes x No o
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes o No x

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 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 filings requirements for the past 90 days. Yes x No o
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 x No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o
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”, and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. o

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes o No x

The aggregate market value of voting common stock held by non-affiliates of the registrant was approximately $9,483,000,000 as of June 29, 2018, the last business day of the registrant’s most recently completed second fiscal quarter (based on the closing sales price for the common stock on the New York Stock Exchange on such date).
As of February 15, 2019, there were 347,922,460 shares of the registrant's common stock outstanding.
DOCUMENTS INCORPORATED BY REFERENCE
As noted herein, the information called for by Part III is incorporated by reference to specified portions of the registrant's definitive proxy statement to be filed in conjunction with the registrant's 2019 Annual Meeting of Stockholders, which is expected to be filed not later than 120 days after the registrant's fiscal year ended December 31, 2018.

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Forward-Looking Statements

This Annual Report on Form 10-K, which we refer to as the Report, including “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” contains forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 regarding future events and the future results of Juniper Networks, Inc., which we refer to as “we,” “us,” or the “Company,” that are based on our current expectations, estimates, forecasts, and projections about our business, our results of operations, the expected impact of the Tax Cuts and Jobs Act, the industry in which we operate and the beliefs and assumptions of our management. All statements other than statement of historical facts are statements that could be deemed to be forward-looking statements. Words such as “expects,” “anticipates,” “targets,” “goals,” “projects,” "will," “would,” “could,” “intends,” “plans,” “believes,” “seeks,” “estimates,” vari words, and similar expressions are intended to identify such forward-looking statements. Forward-looking statements by their nature address matters that are, to different degrees, uncertain, and these forward-looking statements are only predictions and are subject to risks, uncertainties, and assumptions that are difficult to predict. Therefore, actual results may differ materially and adversely from those expressed in any forward-looking statements. Factors that might cause or contribute to such differences include, but are not limited to, those discussed in this Report under the section entitled “Risk Factors” in Item 1A of Part I and elsewhere, and in other reports we file with the U.S. Securities and Exchange Commission, or the SEC. While forward-looking statements are based on reasonable expectations of our management at the time that they are made, you should not rely on them. We undertake no obligation to revise or update publicly any forward-looking statements for any reason, except as required by applicable law.

PART I

ITEM 1. Business

Overview

Juniper Networks designs, develops and sells products and services for high-performance networks to enable customers to build scalable, reliable, secure and cost-effective networks for their businesses, while achieving agility and improved operating efficiency through automation. We sell our products in more than 150 countries in three geographic regions: Americas; Europe, Middle East, and Africa, which we refer to as EMEA; and Asia Pacific, which we refer to as APAC. We sell our high-performance network products and service offerings across routing, switching, and security technologies. In addition to our products, we offer our customers services, including maintenance and support, professional services, and education and training programs.

Our products and services address high-performance network requirements for our customers within our verticals: Cloud, Service Provider, and Enterprise who view the network as critical to their success. We believe our silicon, systems, and software represent innovations that transform the economics and experience of networking, helping our customers achieve superior performance, greater choice, and flexibility, while reducing overall total cost of ownership.

We were incorporated in California in 1996 and reincorporated in Delaware in 1998. Our corporate headquarters are located in Sunnyvale, California. Our website address is www.juniper.net.

Strategy

We deliver highly scalable, reliable, secure and cost-effective networks, while transforming the network's agility, efficiency, and value through automation.

We believe the network needs for our customers in our Cloud, Service Provider, and Enterprise verticals are converging as these customers recognize the need for high-performance networks and are adopting cloud architectures for their infrastructure and service delivery, such as large public and private data centers and service provider edge data centers, for improved agility and greater levels of operating efficiency. We believe this industry trend presents an opportunity for Juniper Networks, and we have focused our strategy on enabling our customers' transition to cloud architectures through the following strategic priorities:

Power Public and Private Cloud Data Centers

We are focused on continuing to power public and private cloud data centers with high performance infrastructure. These data centers are the core of cloud transformation by enabling service delivery in a multicloud environment, which is a combination of public cloud, private cloud, and Software-as-a-Service, or SaaS delivery. We believe we are a recognized leader in networking innovation in both software and hardware. Our Junos Operating System, or Junos OS, application-specific integrated circuits, or ASIC, technology, and management and automation software investments across routing, switching, and security will continue

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to be key elements to maintaining our technology leadership and transforming the economics and experience of our public and private cloud customers.

Connect Users and Devices Securely to the Cloud and to Each Other

In developing our solutions, we strive to design and build best-in-class products and solutions for core, edge, and metro networking infrastructure for connecting user and devices securely to the cloud and to each other. Cloud providers and Service Providers have deployed our product offerings in their wide area networks, or WAN, such as our highly efficient IP transport PTX product which can cost effectively manage incredible capacity from their end users to the data centers from which they deliver the value to those customers. We are committed to continued investment in cost effective and high-performance IP transport platforms and automation software, which forms the basis of these high-performance networks.

Build and Manage Distributed Clouds

Our Service Provider customers are increasingly investing in the build-out of high-performance networks and the transformation of existing legacy infrastructure to distributed cloud environments, which resides in multiple, distributed data centers in order to place applications and services closer to end users, such as enabling managed security and low-latency applications. We are committed to this transformation as our Service Provider customers rearchitect their infrastructure to enable next generation mobile network build-outs, or 5G, and Internet of Things, or IoT, service delivery close to their end users. We believe our history of experience in both cloud and WAN architecture positions us well to partner with our Service Provider customers in their strategic transformation initiatives.

Cloud-Delivered Enterprise

Enterprises are consuming more value-as-a-service, where value is delivered in the form of cloud-based software and services. We have introduced cloud management and security products which enable enterprises to consume cloud infrastructure and services securely. We believe the transition to SaaS presents an opportunity for Juniper to come to market with innovative network and security solutions for our Enterprise customers which facilitate their transition to cloud architectures.

We believe our understanding of high performance networking technology and cloud architecture, and our strategy, position us to capitalize on the industry transition to more automated, cost-efficient, scalable networks.

Customer Verticals

We sell our high-performance network products and service offerings through direct sales; distributors; value-added resellers, or VARs; and original equipment manufacturers, or OEMs, to end-users in the following verticals: Cloud, Service Provider, and Enterprise. In 2018, we revised the naming convention of our key customer verticals as follows and a summary of the types of customers included in our verticals is discussed below.

- Telecom/Cable is now referred to as ‘Service Provider’
- Strategic Enterprise is now referred to as ‘Enterprise’
- Cloud remains unchanged

Further, we believe our networking infrastructure offerings benefit our key customers by:

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Reducing capital and operational costs by running multiple services over the same network using our secure, high density, highly automated, and highly reliable platforms;

- Creating new or additional revenue opportunities by enabling new services to be offered to new market segments, which includes existing customers and new customers, based on our product capabilities;
- Increasing customer satisfaction, while lowering costs, by enabling customers to self-select automatically provisioned service packages that provide the quality, speed, and pricing they desire;
- Providing increased asset longevity and higher return on investment as our customers' networks can scale to higher throughput based on the capabilities of our platforms;

- Offering network security across every environment—from the data center to campus and branch environments to assist in the protection and recovery of services and applications; and
- Offering operational improvements that enable cost reductions, including lower administrative, training, customer care, and labor costs.

The following is an overview of the trends affecting the market in which we operate by each of our customer verticals. We believe the networking needs for each of our customers will eventually result in cloud-based network architectures for improved agility and greater levels of operating efficiency.

Cloud

Our Cloud vertical includes companies that are heavily reliant on the cloud for their business model's success. Customers in the Cloud vertical can include cloud service providers such as the largest public cloud providers, which we refer to as hyperscalers, and Tier-2 cloud providers, as well as enterprises that provide SaaS; infrastructure-as-a-service; or platform-as-a-service.

Cloud providers continue to grow as more organizations take advantage of public infrastructure to run their business. As their businesses grow, we expect they will continue to invest in their networks, which dictates the quality and experience of the products and the services they deliver to their end-customers. Further, as cloud providers begin to early adopt new network technologies, such as the transition to 400-gig Ethernet, this will present further opportunities for Juniper across our portfolio as our cloud customers value high-performance, highly compact, power efficient infrastructures which we support and continue to develop.

In addition, SaaS continues to be an important factor for cloud providers as their customers, such as enterprises, prefer to consume and procure product and service offerings via SaaS models. As a result, we believe that SaaS providers will invest in high performance infrastructure because the quality of experience has proven just as important competitively as software features and functions. Lastly, as a result of new regulations and the need for lower latency and high-performance networking, cloud providers are transitioning to regional network build-outs or distributed cloud environments to address the increasing demand for services, data privacy, data protection, and consumer rights.

As Cloud customers are pushing the envelope in networking, our focus on collaboration combined with networking innovation around automation has made us a strategic partner with these customers, helping them develop high-performance and lower total cost of ownership networking solutions to support their business.

Service Provider

Our Service Provider vertical includes wireline and wireless carriers and cable operators, and we support most of the major carrier and operator networks in the world with our high performance network infrastructure offerings. In recent years, we have seen increased convergence of these different types of customers through acquisitions, mergers, and partnerships.

Service Provider customers recognize the need for high-performance networks and leveraging the cloud to reduce costs from their network operations. This is dictating a change in business models and their underlying infrastructure, which we believe requires investment in the build-out of high-performance networks and the transformation of existing legacy infrastructure to distributed cloud environments in order to satisfy the growth in mobile traffic and video as a result of the increase in mobile device usage including smartphones, tablets, and connected devices of various kinds.

We expect that Network Function Virtualization, or NFV, and software-defined networking, or SDN, will be critical elements to enable our Service Provider customers the flexibility to support enhanced mobile video and dynamic new service deployments. We are engaging with these customers to transition their operations to essentially next-generation cloud operations as the need for a highly efficient infrastructure to handle large amounts of data along with low latency, or minimal delay, plays into the need to have a high performance, scalable infrastructure in combination with the automation and flexibility required to drive down operational costs and rapidly provision applications. We consistently deliver leading technologies that transform the economics and experience of networking-significantly improving customer economics by lowering the capital expenditures required to build networks and the operating expenses required to manage and maintain them.

In addition to reducing operating costs, Service Providers are seeking to create new or additional revenue opportunities to support their evolving business models. These customers are preparing for 5G, which we expect to begin to occur over the next few years, and IoT, which we believe will give rise to new services like connected cars, smart cities, robotic manufacturing, and agricultural transformation. 5G and IoT will require a highly distributed cloud data center architecture from which services are delivered to the end users and will involve a great degree of analytics and embedded security. We expect this trend will present further

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opportunities for Juniper with our focus on delivering a strong portfolio of network virtualization and software-based orchestration solutions, which position us to deliver on the automation and agility requirements needs of Service Providers.

Enterprise

Our high-performance network infrastructure offerings are designed to meet the performance, reliability, and security requirements of the world's most demanding enterprises. We offer enterprise solutions and services for data centers as well as branch and campus applications. Our Enterprise vertical includes enterprises not included in the Cloud vertical. In particular, they are industries with high performance, high agility requirements, including financial services; national, federal, state, and local governments; as well as research and educational institutions. We believe that our Enterprise customers are able to deploy our solutions as a powerful component in delivering the advanced network capabilities needed for their leading-edge applications.

We believe that as our Enterprise customers continue to transition their workloads to the cloud, they continue to seek greater flexibility in how they consume networking and security services, such as pay-per-use models. Additionally, Enterprises are deploying multicloud architectures which require end-to-end solutions for managing, orchestrating, and securing distributed cloud resources as a single pool of resources. Also, we are increasingly seeing a convergence of networking and security, resulting in security becoming an embedded capability in each and every solution that we offer to our customers.

High-performance enterprises require IP networks that are global, distributed, and always available. We are innovating in key technology areas to meet the needs of our Enterprise customers whether they plan to move to a public cloud architecture or hybrid cloud architecture (which is a mix of public and private cloud, as well as a growing number of SaaS applications). In 2018, 2017, and 2016, no single customer accounted for 10% or more of our net revenues.

Products, Services, and Technology

Early in our history, we developed, marketed, and sold the first commercially available purpose-built IP backbone router optimized for the specific high-performance requirements of telecom and cable operators. As the need for core bandwidth continued to increase, the need for service-rich platforms at the edge of the network was created.

We have expanded our portfolio to address multiple domains in the network: core; edge; access and aggregation; data centers; and campus and branch. We have systematically focused on how we innovate in silicon, systems, and software (including our Junos OS and virtual network functions, or VNF) such as firewall, network orchestration, and automation to provide a range of hardware and software solutions in high-performance, secure networking.

Further, our intent is to expand our software business by introducing new software solutions to our product portfolio that simplify the operation of networks, and allow our customers across our key verticals, flexibility in consumption and deployment. Our software offerings include subscription arrangements and perpetual licenses. We believe our software revenues as a percentage of total revenues will increase over time as we introduce new software product offerings and business models designed to better monetize the value of our software offerings.

We conduct business globally and are managed, operated, and organized by major functional departments that operate on a consolidated basis. As a result, we operate in one reportable segment. The following is an overview of our principal product families and service offerings in 2018:

Routing Products

- ACX Series: Our ACX Series Universal Access Routers cost-effectively address current operator challenges to rapidly deploy new high-bandwidth services. The ACX Series is well positioned to address the growing metro Ethernet and mobile backhaul needs of our customers, as we expect 5G mobile network build-outs to begin to occur over the next few years. The platforms deliver the necessary scale and performance needed to support multi-generation wireless technologies.

- MX Series: Our MX Series is a family of high-performance, SDN-ready, Ethernet routers that function as a Universal Edge platform with high system capacity, density, and performance. The MX Series platforms utilize our custom silicon and provide carrier-class performance, scale, and reliability to support large-scale Ethernet deployments. We also offer the vMX, a virtual version of the MX router, which is a fully featured MX Series 3D Universal Edge Router optimized to run as software on x86 servers.

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- PTX Series: Our PTX Series Packet Transport Routers deliver high throughput at a low cost per bit, optimized for the Service Provider core as well as the scale-out architectures of Cloud Providers. The PTX Series is built on our custom silicon and utilizes a forwarding architecture that is focused on optimizing IP/multi-protocol label switching, or MPLS, and Ethernet. This ensures high density and scalability, high availability, and network simplification.

- Cloud Customer Premises Equipment, or CPE, Solution: Our Cloud CPE is a fully automated, end-to-end NFV solution that builds on Juniper Networks Contrail Networking and supports cloud-based and premises-based VNFs. This solution includes Contrail Service Orchestration, a comprehensive management and orchestration platform that delivers and manages virtualized network services such as virtual security, and the NFX security family, a network services platform that can operate as a secure, on-premises device running software defined wide area network, or SD-WAN, and multiple virtual services, from Juniper and third parties, simultaneously.

- NorthStar Controller: Our wide-area network SDN controller automates the creation of traffic-engineering paths across the network, increasing network utilization and enabling a customized programmable networking experience.

Switching Products

- EX Series: Our EX Series Ethernet switches address the access, aggregation, and core layer switching requirements of micro branch, branch office, and campus environments, providing a foundation for the fast, secure, and reliable delivery of applications able to support strategic business processes. Our EX switches can also serve as security enforcement points as part of our Unified Cybersecurity Platform.

- QFX Series: Our QFX Series of core, spine and top-of-rack data center switches offer a revolutionary approach to switching that are designed to deliver dramatic improvements in data center performance, operating costs, and business agility for enterprises, high-performance computing networks, and cloud providers. Our QFX switches can also serve as security enforcement points as part of our Unified Cybersecurity Platform.

Security Products

- SRX Series Services Gateways for the Data Center and Network Backbone: Our mid-range, high-end and virtual SRX Series platforms provide high-performance, scalability, and service integration, which are ideally suited for medium to large enterprise, data centers and large campus environments where scalability, high performance, and concurrent services, are essential. Our high-end SRX5800 platform is suited for service provider, large enterprise, and public sector networks. The upgrade to our high-end SRX firewall offering with our Services Process Card 3, or SPC3, with our Advanced Security Acceleration line card enhances the SRX5800 to deliver power for demanding use cases, including high-end data centers, IoT, and 5G.

- Branch SRX, Security Policy and Management: The Branch SRX family provides an integrated firewall and next-generation firewall, or NGFW, capabilities. Security Director is a network security management product that offers efficient, highly scalable, and comprehensive network security policy management. These solutions are designed to enable organizations to securely, reliably, and economically deliver powerful new services and applications to all locations and users with superior service quality.

- Virtual Firewall: Our vSRX Firewall delivers all of the features of our physical firewalls, including NGFW functionality, advanced security, and automated lifecycle management capabilities. The vSRX provides scalable, secure protection across private, public, and hybrid clouds. We also offer the cSRX which has been designed and optimized for container and cloud environments.

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Advanced Malware Protection: Our Advanced Threat Prevention portfolio consists of Sky ATP, a cloud-based service and Juniper ATP, or JATP, a premises-based solution. These products are designed to use both static and dynamic analysis with machine learning to find unknown threat signatures (zero-day attacks).

Services

In addition to our products, we offer maintenance and support, professional, and educational services. We utilize a multi-tiered support model to deliver services that leverage the capabilities of our own direct resources, channels partners, and other third-party organizations.

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We also train our channel partners in the delivery of support, professional, and educational services to ensure these services can be locally delivered.

As of December 31, 2018, we employed 1,818 people in our worldwide customer service and support organization. We believe that a broad range of services is essential to the successful customer deployment and ongoing support of our products, and we employ remote technical support engineers, on-site resident engineers, spare parts planning and logistics staff, professional services consultants and educators with proven network experience to provide those services.

Platform Strategy

In addition to our major product families and services, our software portfolio has been a key technology element in our goal to be a leader in high-performance networking.

Our Junos Platform enables our customers to expand network software into the application space, deploy software clients to control delivery, and accelerate the pace of innovation with an ecosystem of developers. At the heart of the Junos Platform is Junos OS. We believe Junos OS is fundamentally differentiated from other network operating systems not only in its design, but also in its development capabilities. The advantages of Junos OS include:

- One modular operating system with common base of code and a single, consistent implementation for each control plane feature;

- A highly disciplined and firmly scheduled development process; and

- One common modular software architecture that scales across all Junos-based platforms.

Junos OS is designed to improve the availability, performance, and security of business applications running across the network. Junos OS helps to automate network operations by providing a single consistent implementation of features across the network in a single release train that seeks to minimize the complexity, cost, and risk associated with implementing network features and upgrades.

Orchestration and Monitoring

As many of our customers are moving to a hybrid, multicloud environment, managing, orchestrating, and securing that complex environment can be a challenge. We are committed to providing solutions to simplify networking operations to help our customers to optimize their infrastructure and workload placement across their hybrid, multicloud environment with the following offerings:

- Contrail: Our Contrail Networking and Contrail Cloud Platform offer an open-source, standards-based platform for SDN and NFV. This platform enables our customers to address their key problems in the area of network automation, agility, and time-to-service deployment by providing a mechanism to virtualize the network over any physical network and automating the provisioning and management of networking services (such as security and load balancing). Contrail Enterprise Multicloud and Contrail Edge Cloud provide packaged solutions designed for Enterprise multicloud and Service Provider Edge environments, respectively. Contrail’s approach is to support multiple cloud and hardware vendors, various types of workloads, and both existing and new deployments. In late 2018, we completed the acquisition of HTBase Corporation ("HTBase"), a company that has developed a unique and disruptive platform for software-defined enterprise multicloud, which we expect will accelerate our leadership in multicloud and function with the compute orchestration capabilities of Contrail Enterprise Multicloud.

- AppFormix: AppFormix is an optimization and management software platform for public, private, and hybrid clouds. This intent-driven software manages automated operations, visibility, and reporting in cloud and NFV use cases. It features machine learning-based policy and smart monitors, application and software-defined infrastructure analytics, and alarms to provide comprehensive visualization, smart analytics, and the ability to manage automatic remediation for service assurance.

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Significant Product Development Projects and Solutions

In 2018, we continued to execute on our product and solutions strategy and announced several new innovations that we expect to bring to market over the next few quarters, including the industry's first 400-gig optimized routing platform; a new high-performance MX Series 5G Universal Routing Platform with new programmable silicon; and our multi-cloud orchestration and telemetry platform, including Contrail Edge Cloud and Contrail Enterprise Multicloud, each of which, we believe, will help strengthen our position across our core markets.

We also announced new initiatives under an existing partnership with Nutanix, which we expect will help strengthen our ability to capitalize on multicloud with our Contrail Enterprise Multicloud integration with Nutanix’s application programming interface, or APIs providing enhanced network visibility. Further, we entered into a new partnership with Ericsson to accelerate 5G initiatives by leveraging each company’s complementary portfolios to drive our competitive advantage in the marketplace.

Research and Development

We have assembled a team of skilled engineers with extensive experience in the fields of high-end computing, network system design, ASIC design, security, routing protocols, software applications and platforms, and embedded operating systems. As of December 31, 2018, we employed 3,692 people in our worldwide R&D organization.

We believe that strong product development capabilities are essential to our strategy of enhancing our core technology, developing additional applications, integrating that technology, and maintaining the competitiveness and innovation of our product and service offerings. In our products, we are leveraging our software, ASIC and systems technology, developing additional network interfaces targeted to our customers' applications, and continuing to develop technology to support the build-out of secure high-performance networks and cloud environments. We continue to expand the functionality of our products to improve performance, reliability and scalability, and to provide an enhanced user interface.

Our R&D process is driven by our corporate strategy and the availability of new technology, market demand, and customer feedback. We have invested significant time and resources in creating a structured process for all product development projects. Following an assessment of market demand, our R&D team develops a full set of comprehensive functional product specifications based on inputs from the product management and sales organizations. This process is designed to provide a framework for defining and addressing the steps, tasks, and activities required to bring product concepts and development projects to market.

Sales and Marketing

As of December 31, 2018, we employed 2,425 people in our worldwide sales and marketing organization. These sales and marketing employees operate in different locations around the world in support of our customers.

Our sales organization, with its structure of sales professionals, business development teams, systems engineers, marketing teams, channel teams, and an operational infrastructure team are generally distributed between vertical markets. Within each team, sales team members serve the following three geographic regions: (i) Americas (including United States, Canada, Mexico, Caribbean and Central and South America), (ii) EMEA, and (iii) APAC. Within each region, there are regional and country teams, as well as vertical market focused teams, to ensure we operate close to our customers.

Our sales teams operate in their respective regions and generally either engage customers directly or manage customer opportunities through our distribution and reseller relationships as described below.

We sell to a number of Cloud and Service Provider customers directly. Otherwise, we sell to all of our key customer verticals primarily through distributors and resellers.

In 2019, we transitioned our sales organization to better align our sales strategy to each of our customer verticals. We believe the alignment of our sales leadership and product management teams across our customer verticals will position us for improved sales force productivity in late 2019 and position Juniper to better capitalize on our end market opportunities in the long-term.

Direct Sales Structure

The terms and conditions of direct sales arrangements are governed either by customer purchase orders and our order acknowledgment terms for those orders or by purchase contracts. The direct contracts with these customers set forth only general terms of sale and generally do not require customers to purchase specified quantities of our products. We directly receive and process customer purchase orders.

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Channel Sales Structure

A critical part of our sales and marketing efforts are our channel partners through which we conduct the majority of our sales. We utilize various channel partners, including, but not limited to the following:

- A global network of strategic distributor relationships, as well as region-specific or country-specific distributors who in turn sell to local VARs who sell to end-user customers. Our distribution channel partners resell routing, switching, and security products and services, which are purchased by all of our key customer verticals. These distributors tend to focus on particular regions or countries within regions. For example, we have substantial distribution relationships with Ingram Micro in the Americas and Hitachi in Japan. Our agreements with these distributors are generally non-exclusive, limited by region, and provide product and service discounts and other ordinary terms of sale. These agreements do not require our distributors to purchase specified quantities of our products or services. Further, most of our distributors sell our competitors' products and services, and some sell their own competing products and services.

- VARs and Direct value-added resellers, including our strategic worldwide alliance partners referenced below, resell our products to end-users around the world. These channel partners either buy our products and services through distributors, or directly from us, and have expertise in designing, selling, implementing, and supporting complex networking solutions in their respective markets. Our agreements with these channel partners are generally non-exclusive, limited by region, and provide product and service discounts and other ordinary terms of sale. These agreements do not require these channel partners to purchase specified quantities of our products or services. Increasingly, our Cloud and Service Provider customers also resell our products or services to their customers or purchase our products or services for the purpose of providing managed or cloud-based services to their customers.

- Strategic worldwide reseller relationships with established Juniper alliances, comprised of Dimension Data Holdings, or Dimension Data; Ericsson Telecom A.B., or Ericsson; International Business Machines, or IBM; and NEC Corporation. These companies each offer services and products that complement our own product and service offerings and act as a reseller, and in some instances as an integration partner for our products. Our arrangements with these partners allow them to resell our products and services on a non-exclusive and generally global basis, provide for product and service discounts, and specify other general terms of sale. These agreements do not require these partners to purchase specified quantities of our products or services.

Manufacturing and Operations

As of December 31, 2018, we employed 340 people in worldwide manufacturing and operations who manage our supply chain including relationships with our contract manufacturers, original design manufacturers, component suppliers, warehousing and logistics service providers.

Our manufacturing is primarily conducted through contract manufacturers and original design manufacturers in the United States, or U.S., China, Malaysia, Mexico, and Taiwan. As of December 31, 2018, we utilized Celestica Incorporated, Flextronics International Ltd., Accton Technology Corporation, and Alpha Networks Inc. for the majority of our manufacturing activity. Our contract manufacturers and original design manufacturers are responsible for all phases of manufacturing from prototypes to full production including activities such as material procurement, surface mount assembly, final assembly, test, control, shipment to our customers, and repairs. Together with our contract manufacturers and original design manufacturers, we design, specify, and monitor the tests that are required to ensure that our products meet internal and external quality standards. We believe that these arrangements provide us with the following benefits:

- We can quickly ramp up and deliver products to customers with turnkey manufacturing;

- We gain economies of scale by leveraging our buying power with our contract manufacturers and original design manufacturers when we manufacture large quantities of products;

- We operate with a minimum amount of dedicated space and employees for manufacturing operations; and

- We can reduce our costs by reducing what would normally be fixed overhead expenses.

Our contract manufacturers and original design manufacturers build our products based on our rolling product demand forecasts. Each contract manufacturer procures components necessary to assemble the products in our forecast and tests the products according to agreed-upon specifications. Products are then shipped to our distributors, VARs, or end-users. Generally, we do not own the components. Title to the finished goods is generally transferred from the contract manufacturers to us when the products leave the contract manufacturer's or original design manufacturer's location. Customers take title to the products upon delivery at a specified destination. If the product or components remain unused or the products remain unsold for a specified period, we may incur carrying charges or charges for excess or obsolete materials.

Our contracts with our contract manufacturers and original design manufacturers set forth a framework within which the contract manufacturer and original design manufacturer, as applicable, may accept purchase orders from us. These contracts do not represent long-term commitments.

We also purchase and hold inventory for strategic reasons and to mitigate the risk of shortages of certain critical components; the majority of this inventory is production components. As a result, we may incur additional holding costs and obsolescence charges, particularly resulting from uncertainties in future product demand.

Some of our custom components, such as ASICs, are manufactured primarily by sole or limited sources, each of which is responsible for all aspects of production using our proprietary designs. To ensure the security and integrity of Juniper products during manufacture, assembly and distribution, we have implemented a supply chain risk management framework as part of our overall Brand Integrity Management System. This framework encompasses all aspects of the supply chain as well as enhanced elements specific to security issues applicable to Juniper products and our customers.

By working collaboratively with our suppliers, we endeavor to promote socially responsible business practices beyond our company and throughout our worldwide supply chain. To this end, we have adopted a business partner code of conduct and promote compliance with such code of conduct to our suppliers. Our business partner code of conduct expresses support for and is aligned with the Ten Principles of the United Nations Global Compact and the Responsible Business Alliance Code of Conduct. The Responsible Business Alliance, a coalition of electronics, retail, auto and toy companies, provides guidelines and resources to drive performance and compliance with critical corporate social responsibility policies. Its goals are to promote ethical business practices, to ensure that working conditions in the electronic industry supply chain are safe, that workers are treated with respect and dignity, and that manufacturing processes are environmentally responsible. By using standard audit and assessment protocols and tools, we measure and monitor manufacturing partners' and direct material suppliers' compliance to the codes of conduct, including but not limited to: onsite audits; risk assessments; CDP climate change and water requests; and conflict minerals surveys. CDP is a global standardized mechanism by which companies can report their environmental performance on climate change and water and forest programs to institutional investors and customers. Our Corporate Citizenship and Sustainability Report and Business Partner Code of Conduct are available on our website.

Backlog

Our sales are made primarily pursuant to purchase orders under framework agreements either with our distributors, resellers, or end-customers. At any given time, we have backlog orders for products that have not shipped. Because customers may cancel purchase orders or change delivery schedules without significant penalty, we believe that our backlog at any given date may not be a reliable indicator of future operating results. As of December 31, 2018 and December 31, 2017, our total product backlog was approximately $344.3 million and $400.7 million[*], respectively. Our product backlog consists of confirmed orders for products scheduled to be shipped to our distributors, resellers, or end-customers, generally within the next six months. Backlog excludes certain future revenue adjustments for items such as product revenue deferrals, sales return reserves, service revenue allocations, and early payment discounts.

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[*] Prior to January 1, 2018, our product backlog consisted of confirmed orders for products scheduled to be shipped to customers, generally within the next six months, and excluded orders from distributors as we recognized product revenue on sales made through distributors upon sell-through to end-users. Backlog also excluded certain future revenue adjustments for items such as product revenue deferrals, rebates, stock rotation reserves, sales return

reserves, service revenue allocations, and early payment discounts.

Seasonality

We, as do many companies in our industry, experience seasonal fluctuations in customer spending patterns. Historically, we have experienced stronger customer demand in the fourth quarter and weaker demand in the first quarter. This historical pattern should not be considered a reliable indicator of our future net revenues or financial performance.

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Competition

We compete in the network infrastructure markets. These markets are characterized by rapid change, converging technologies, and a migration to solutions that combine high performance networking with cloud technologies. In the network infrastructure business, Cisco Systems, Inc., or Cisco, has historically been the dominant player. However, our principal competitors also include Arista Networks, Inc., or Arista; Dell Inc., or Dell; Hewlett Packard Enterprise Co., or HPE; Huawei Technologies Co., Ltd., or Huawei; and Nokia Corporation, or Nokia.

Many of our current and potential competitors, such as Cisco, Nokia, HPE, and Huawei, among others, have broader portfolios which enable them to bundle their networking products with other networking and information technology products in a manner that may discourage customers from purchasing our products. Many of our current and potential competitors have greater name recognition, marketing budgets, and more extensive customer bases that they may leverage to compete more effectively. Increased competition could result in price reductions, fewer customer orders, reduced gross margins, and loss of market share, negatively affecting our operating results.

In addition, there are a number of other competitors in the security network infrastructure space, including Palo Alto Networks, Inc., or Palo Alto Networks; Check Point Software Technologies, Ltd., or Check Point; F5 Networks, Inc., or F5 Networks; and Fortinet, Inc., or Fortinet; among others, who tend to be focused specifically on security solutions and, therefore, may be considered specialized compared to our broader product line.

We expect that over time, large companies with significant resources, technical expertise, market experience, customer relationships, and broad product lines, such as Cisco, Nokia, and Huawei, will introduce new products designed to compete more effectively in the market. There are also several other companies that aim to build products with greater capabilities to compete with our products. Further, there has been significant consolidation in the networking industry, with smaller companies being acquired by larger, established suppliers of network infrastructure products. We believe this trend is likely to continue which may increase the competitive pressure faced by us due to their increased size and breadth of their product portfolios.

In addition to established competitors, a number of public and private companies have announced plans for new products to address the same needs that our products address. We believe that our ability to compete depends upon our ability to demonstrate that our products are superior and cost effective in meeting the needs of our current and potential customers.

As a result, we expect to face increased competition in the future from larger companies with significantly more resources than we have and also from emerging companies that are developing new technologies. Although we believe that our technology and the purpose-built features of our products make them unique and will enable us to compete effectively with these companies, there can be no assurance that new products, enhancements or business strategies will achieve widespread market acceptance.

Environment

We are committed to maintaining compliance with all environmental laws applicable to our operations, products and services and to reducing our environmental impact across our business and supply chain. Our operations and many of our products are subject to various federal, state, local and foreign regulations that have been adopted with respect to the environment, such as the Waste Electrical and Electronic Equipment, or WEEE, Directive; Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, or RoHS; and Registration, Evaluation, Authorization, and Restriction of Chemicals, or REACH, regulations adopted by the European Union, or EU, and China. To date, compliance with federal, state, local, and foreign laws enacted for the protection of the environment has had no material effect on our capital expenditures, earnings, or competitive position.

However, see the risk factor entitled "Regulation of our industry in general and the telecommunications industry in particular could harm our operating results and future prospects" in the section entitled Risk Factors in Item 1A of Part I of this Report for additional information concerning regulatory compliance.

Juniper’s greatest impact on the environment is through our products and services. Juniper has an environmental program, based on our new product introduction process that supports a circular economy model for environmental sustainability and focuses on energy efficiency, materials innovation, and recyclability. We consider opportunities to minimize resource impacts and improve efficiencies over a product’s life cycle, from the materials we use and a product’s energy footprint, to packaging and end-of-life, or EOL, activities such as reuse, refurbishment, and recycling.

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We are committed to the environment through our efforts to improve the energy efficiency per gigabit of throughput of key elements in our high-performance network product offerings. Our products are independently tested by third parties for energy efficiency compliance. As an example, our MX10008 and MX10016 products redefine per-slot economics, enabling customers to do more with less while simplifying network design and reducing operating expenses, by consuming 0.6W per Gigabit of throughput. Additionally, we have redesigned packaging in ways that optimizes costs while minimizing resource impacts.

We are also voluntarily participating in CDP climate change and water disclosures and encourage our direct material suppliers to do the same. Additionally, we are a member of the Responsible Business Alliance, or RBA, and have adopted and promote the adoption by our suppliers of the practices of the RBA Code of Conduct, as discussed above in the section entitled Manufacturing and Operations. We continue to invest in the infrastructure and systems required to execute on, monitor and drive environmental improvements in our global operations and within our supply chain.

Intellectual Property

Our success and ability to compete are substantially dependent upon our internally developed technology and expertise, as well as our ability to obtain and protect necessary intellectual property rights. While we rely on patent, copyright, trade secret, and trademark law, as well as confidentiality agreements, to protect our technology, we also believe that factors such as the technological and creative skills of our personnel, new product developments, frequent product enhancements, and reliable product maintenance are essential to establishing and maintaining a technology leadership position. There can be no assurance that others will not develop technologies that are similar or superior to our technology.

In addition, we integrate licensed third-party technology into certain of our products and, from time to time, we need to renegotiate these licenses or license additional technology from third parties to develop new products or product enhancements or to facilitate new business models. There can be no assurance that third-party licenses will be available or continue to be available to us on commercially reasonable terms or at all. Our inability to maintain or re-license any third-party licenses required in our products or our inability to obtain third-party licenses necessary to develop new products and product enhancements could require us to obtain substitute technology of lower quality or performance standards or at a greater cost, any of which could harm our business, financial condition, and results of operations.

As of December 31, 2018, we had over 3,100 patents worldwide and numerous patent applications are pending. Patents generally have a term of twenty years from filing. As our patent portfolio has been built over time, the remaining terms on the individual patents vary. We cannot be certain that patents will be issued on the patent applications that we have filed, that we will be able to obtain the necessary intellectual property rights, or that other parties will not contest our intellectual property rights.

Employees

As of December 31, 2018, we had 9,283 full-time employees. We have not experienced any work stoppages, and we consider our relations with our employees to be good. Competition for qualified personnel in our industry is intense. We believe that our future success depends in part on our continued ability to hire, motivate, and retain qualified personnel. We believe that we have been successful in recruiting qualified employees, but there is no assurance that we will continue to be successful in the future.

Our future performance depends significantly upon the continued service of our key technical, sales, and senior management personnel, none of whom are bound by an employment agreement requiring service for any defined period of time. The loss of one or more of our key employees could have a material adverse effect on our business, financial condition, and results of operations.

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Executive Officers of the Registrant

The following sets forth certain information regarding our executive officers as of the filing of this Report:

Name	Age	Position
Rami Rahim	48	Chief Executive Officer and Director
Anand Athreya	55	Executive Vice President, Chief Development Officer
Bikash Koley	45	Executive Vice President, Chief Technology Officer
Manoj Leelanivas	49	Executive Vice President, Chief Product Officer
Brian Martin	57	Senior Vice President, General Counsel and Secretary
Kenneth B. Miller	48	Executive Vice President, Chief Financial Officer
Terrance F. Spidell	50	Vice President, Corporate Controller and Chief Accounting Officer

RAMI RAHIM joined Juniper in January 1997 and became Chief Executive Officer of Juniper, and a member of the Board of Directors, in November 2014. From March 2014 until he became Chief Executive Officer, Mr. Rahim served as Executive Vice President and General Manager of Juniper Development and Innovation, or JDI. His responsibilities included driving strategy, development and business growth for routing, switching, security, silicon technology, and the Junos operating system. Previously, Mr. Rahim served Juniper in a number of roles, including Executive Vice President, Platform Systems Division, Senior Vice President and General Manager, Edge and Aggregation Business Unit, or EABU, and Vice President, Product Management for EABU. Prior to that, Mr. Rahim spent the majority of his time at Juniper in the development organization where he helped with the architecture, design and implementation of many Juniper core, edge, and carrier Ethernet products. Mr. Rahim holds a Bachelor of Science degree in Electrical Engineering from the University of Toronto and a Master of Science degree in Electrical Engineering from Stanford University.

ANAND ATHREYA joined Juniper in August 2004 and became Executive Vice President and Chief Development Officer in August 2017. In this role, he is responsible for Juniper's Engineering organization. Since joining Juniper, Mr. Athreya has held various leadership positions within Engineering, including most recently serving as Senior Vice President of Engineering from May 2014 through August 2017, and Corporate Vice President of Engineering from February 2011 through May 2014. Mr. Athreya joined Juniper from Procket Networks, a maker of routers and routing technology, where he served as Director of Software Engineering. Prior to that, he was Vice President of Engineering at Malibu Networks, a supplier of fixed wireless networking based broadband solutions, Assistant Vice President of Product Management and Strategy at Tiara Networks, a provider of broadband access systems, and held engineering roles at Novell, a software and services company. Mr. Athreya received his Bachelor degree in Electrical Engineering from Bangalore University, a master's degree in Computer Science and Engineering from Osmania University, and an MBA from National University. He is also a graduate of the Advanced Management Program at Harvard Business School.

BIKASH KOLEY joined Juniper in September 2017 as Executive Vice President, Chief Technology Officer. From January 2008 to August 2017, Mr. Koley worked at Google, Inc. ("Google"), a global technology company, where he served most recently as a Distinguished Engineer and the Head of Network Architecture, Engineering and Planning from November 2015 through August 2017. In this role, he helped to design, build and operate Google's production network infrastructure. In addition, from May 2012 through October 2015 Mr. Koley served as a Principal Architect and Director, Network Architecture and Engineering at Google. Prior to Google, Mr. Koley was the CTO of Qstreams Networks, a company he co-founded. He also spent several years at Ciena Corporation, a network strategy and technology company, in various technical roles. Mr. Koley received his Bachelor of Technology degree in Electronics and Communications Engineering from the Indian Institute of Technology, Kharagpur, India and M.S. and Ph.D. degrees in Electrical and Computer Engineering from the University of Maryland at College Park.

MANOJ LEELANIVAS joined Juniper in March 2018 as Executive Vice President, Chief Product Officer. In this role, Mr. Leelanivas leads all aspects of product strategy and direction for Juniper and helps to align products with our go-to-market strategies and execution, including marketing operations. From June 2013 to September 2017, Mr. Leelanivas was President and CEO of Cyphort, an innovator in scale-out security analytics technology, that was acquired by Juniper in September 2017. From March 1999 to May 2013, he held several key product management positions at Juniper, including Executive Vice President of Advanced Technologies Sales for data center. Mr. Leelanivas holds a Bachelor of Technology in Computer Engineering from the National Institute of Technology Karnataka, an M.S. in Computer Science from the University of Kentucky, and is a graduate of the Stanford University Executive Business Program.

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BRIAN MARTIN joined Juniper in October 2015 as Senior Vice President, General Counsel and Secretary. In January 2018, Mr. Martin also assumed the role of interim Chief Human Resources Officer ("CHRO") until October 2018, while the Company continued its search for a full-time CHRO. From April 2007 to September 2015, Mr. Martin served as Executive Vice President, General Counsel and Corporate Secretary of KLA-Tencor Corporation ("KLA-Tencor"), a provider of process control and yield management solutions. Prior to joining KLA-Tencor, Mr. Martin spent ten years in senior legal positions at Sun Microsystems, Inc. ("Sun"), a manufacturer of computer workstations, servers, software, and services for networks, most recently as Vice President, Corporate Law Group, responsible for legal requirements associated with Sun's corporate securities, mergers, acquisitions and alliances, corporate governance and Sarbanes-Oxley compliance, and litigation management. Prior to joining Sun, Mr. Martin was in private practice where he had extensive experience in antitrust and intellectual property litigation. Mr. Martin holds a bachelor's degree in economics from the University of Rochester and a J.D. from the State University of New York at Buffalo Law School.

KENNETH B. MILLER joined Juniper in June 1999 and has served as our Executive Vice President, Chief Financial Officer since February 2016. Mr. Miller will assume the role of Interim Chief Accounting Officer while the Company continues to search for a full-time Chief Accounting Officer following Mr. Spidell's resignation, as described in Mr. Spidell's biography below. From April 2014 to February 2016, Mr. Miller served as our Senior Vice President, Finance, where he was responsible for the finance organization across the Company, as well as our treasury, tax and global business services functions. Previously, Mr. Miller served as our Vice President, Go-To-Market Finance; Vice President, Platform Systems Division; Vice President, SLT Business Group Controller and in other positions in our Finance and Accounting organizations. Mr. Miller holds a Bachelor of Science degree in Accounting from Santa Clara University.

TERRANCE F. SPIDELL joined Juniper in August 2011 as Vice President, Assistant Corporate Controller, and has served as Vice President, Corporate Controller since November 2012. In 2013, Mr. Spidell assumed the position of our Chief Accounting Officer. Before joining Juniper, Mr. Spidell was at VeriSign, Inc., a provider of Internet infrastructure services, as Vice President, Corporate Controller, from June 2009 through July 2011 and as Vice President, Accounting Operations, from March 2008 through June 2009. Prior to VeriSign, Mr. Spidell held various positions, most recently Senior Manager, at PricewaterhouseCoopers, a registered public accounting firm. Mr. Spidell is a Certified Public Accountant and holds a Bachelor of Business Administration degrees in Finance and Accounting, from Boise State University.

Mr. Spidell's full-time employment with Juniper will end on the business day immediately following the date that Juniper's Annual Report on Form 10-K for the fiscal year 2018 is filed with the SEC.

Available Information

We file our annual reports on Form 10-K, quarterly reports on Form 10-Q, and current reports on Form 8-K pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, with the SEC electronically. The SEC maintains a website that contains reports, proxy and information statements, and other information regarding issuers, including Juniper Networks that file electronically with the SEC. The address of that website is https://www.sec.gov.

You may obtain a free copy of our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, and amendments to those reports on our website at http://www.juniper.net or by sending an e-mail message to Juniper Networks Investor Relations at investorrelations@juniper.net. Such reports and other information are available on our website as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. Our Corporate Governance Standards, the charters of our Audit Committee, Compensation Committee, and Nominating and Corporate Governance Committee, as well as our Worldwide Code of Business Conduct are also available on our website. Information on our website is not, and will not be deemed, a part of this report or incorporated into any other filings the Company makes with the SEC.

Investors and others should note that we announce material financial and operational information to our investors using our Investor Relations website (http://investor.juniper.net), press releases, SEC filings and public conference calls and webcasts. We also use the Twitter accounts @JuniperNetworks and the Company’s blogs as a means of disclosing information about the Company and for complying with our disclosure obligations under Regulation FD. The social media channels that we use as a means of disclosing information described above may be updated from time to time as listed on our Investor Relations website.

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Item 1A. Risk Factors

Factors That May Affect Future Results

Investments in our securities involve significant risks. Even small changes in investor expectations for our future growth and earnings, whether as a result of actual or rumored financial or operating results, changes in the mix of the products and services sold, acquisitions, industry changes, or other factors, could trigger, and have triggered in the past, significant fluctuations in the market price of our common stock. Investors in our securities should carefully consider all of the relevant factors disclosed by us, including, but not limited to, the following factors, that could affect our business, operating results, and stock price.

Our quarterly results are unpredictable and subject to substantial fluctuations; as a result, we may fail to meet the expectations of securities analysts and investors, which could adversely affect the trading price of our common stock.

Our revenues and operating results may vary significantly from quarter-to-quarter due to a number of factors, many of which are outside of our control and any of which may cause our stock price to fluctuate.

The factors that may cause our quarterly results to vary quarter by quarter and be unpredictable include, but are not limited to:

- unpredictable ordering patterns and limited or reduced visibility into our customers’ spending plans and associated revenue;
- changes in customer mix;
- changes in the demand for our products and services;
- changes in the mix of products and services sold;
- changes in the mix of geographies in which our products and services are sold;
- changing market and economic conditions;
- current and potential customer, partner and supplier consolidation and concentration;
- price and product competition;
- long sales, qualification and implementation cycles;
- success in new and evolving markets and emerging technologies;
- how well we execute on our strategy and operating plans and the impact of changes in our business model that could result in significant restructuring charges;
- ability of our customers, channel partners, contract manufacturers and suppliers to purchase, market, sell, manufacture or supply our products (or components of our products) and services;
- financial stability of our customers, including the solvency of private sector customers and statutory authority for government customers to purchase goods and services;
- our ability to achieve targeted cost reductions;
- changes in tax laws or accounting rules, or interpretations thereof;
- changes in the amount and frequency of share repurchases or dividends;
- regional economic and political conditions; and
- seasonality.

For example, we, and many companies in our industry, experience adverse seasonal fluctuations in customer spending, particularly in the first quarter. In addition, while we may have backlog orders for products that have not shipped, we believe that our backlog may not be a reliable indicator of future operating results for a number of reasons, including project delays, changes in project scope and the fact that our customers may cancel purchase orders or change delivery schedules without significant penalty. Furthermore, market trends, competitive pressures, commoditization of products, rebates and discounting, increased component or logistics costs, issues with product quality, regulatory impacts and other factors may result in reductions in revenue or pressure on gross margins in a given period, which may necessitate adjustments to our operations. Such adjustments may be difficult or impossible to execute in the short or medium term.

As a result of the factors described above, as well as other variables affecting our operating results, we believe that quarter-to-quarter comparisons of operating results are not necessarily a good indication of what our future performance will be. In the past, our operating results have been below our guidance, our long-term financial model or the expectations of securities analysts or investors, and this may happen in the future, in which case the price of our common stock may decline and has declined in the past. Such a decline could also occur, and has occurred in the past, even when we have met our publicly stated revenues and/or earnings guidance.

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We expect our gross margins and operating margins to vary over time.

We expect our product and service gross margins to vary, both in the near-term and in the long-term, and may be adversely affected in the future by numerous factors, some of which have occurred and may occur in the future, including customer, vertical, product and geographic mix shifts, an increase or decrease in our software sales or services we provide, increased price competition in one or more of the markets in which we compete, changes in the actions of our competitors or their pricing strategies, which may be difficult to predict and respond to, modifications to our pricing strategy in order to gain footprint in certain markets or with certain customers, currency fluctuations that impact our costs or the cost of our products and services to our customers, increases in material, labor, logistics, warranty costs, or inventory carrying costs, excess product component or obsolescence charges from our contract manufacturers, issues with manufacturing or component availability, quality or efficiencies, increased costs due to changes in component pricing or charges incurred due to inaccurately forecasting product demand, warranty related issues, or our introduction of new products and enhancements or entry into new markets with different pricing and cost structures. For example, in fiscal year 2018, our margins decreased as compared to fiscal year 2017, primarily due to lower net revenues and product mix. In fiscal year 2017, our margins decreased as compared to fiscal year 2016, primarily due to lower product net revenues and product mix, resulting from the year-over-year decline in routing revenues, our customers' architectural shifts, and higher costs of certain memory components. In fiscal year 2016, our margins decreased compared to fiscal year 2015, primarily due to elevated pricing pressure and product mix. Failure to sustain or improve our gross margins reduces our profitability and may have a material adverse effect on our business and stock price.

Further, while we will continue to remain diligent in our long-term financial objective to increase revenue and operating margins and manage our operating expenses as a percentage of revenue. We expect that our margins will vary with our ability to achieve these goals. We can provide no assurance that we will be able to achieve all or any of the goals of these plans or meet our announced expectations, in whole or in part, or that our plans will have the intended effect of improving our margins on the expected timeline, or at all.

A limited number of our customers comprise a material portion of our revenues and any changes in the way they purchase products and services from us could affect our business. In addition, there is an ongoing trend toward consolidation in the industry in which our customers and partners operate. Any decrease in revenues from our customers or partners could have an adverse effect on our net revenues and operating results.

A material portion of our net revenues, across each customer vertical, depends on sales to a limited number of customers and distribution partners. Changes in the business requirements or focus, vendor selection, project prioritization, financial prospects, capital resources, and expenditures, or purchasing behavior (including product mix purchased or delays in deployment) of our key customers could significantly decrease our sales to such customers or could lead to delays or cancellations of planned purchases of our products or services, which increases the risk of quarterly fluctuations in our revenues and operating results. Any of these factors could adversely affect our business, financial condition, and results of operations.

In addition, in recent years, there has been movement towards consolidation in the telecommunications industry (for example, CenturyLink, Inc.'s acquisition of Level 3 Communications, Inc., Vodafone India's acquisition of Idea Cellular Ltd. and T-Mobile US, Inc.'s proposed acquisition of Sprint Corp.) and that consolidation trend has continued. Certain telecommunications companies have also moved towards vertical consolidation through acquisitions of media and content companies, such as Verizon's acquisition of Yahoo, AT&T's acquisition of Time Warner, and Comcast's acquisition of Sky. If our customers or partners are parties to consolidation transactions they may delay, suspend or indefinitely reduce or cancel their purchases of our products or other direct or indirect unforeseen consequences could harm our business, financial condition, and results of operations.

Fluctuating economic conditions make it difficult to predict revenues and gross margin for a particular period and a shortfall in revenues or increase in costs of production may harm our operating results.

Our revenues and gross margin depend significantly on general economic conditions and the demand for products in the markets in which we compete. Economic weakness or uncertainty, customer financial difficulties, and constrained spending on network expansion and enterprise infrastructure have in the past resulted in, and may in the future result in, decreased revenues and earnings. Such factors could make it difficult to accurately forecast revenues and operating results and could negatively affect our ability to provide accurate forecasts to our contract manufacturers and manage our contract manufacturer relationships and other expenses. In addition, economic instability or uncertainty, as well as continued turmoil in the geopolitical environment in many parts of the world, have, and may continue to, put pressure on economic conditions, which has led and could lead, to reduced demand for our products, to delays or reductions in network expansions or infrastructure projects, and/or higher costs of production. More generally-speaking, economic weakness may also lead to longer collection cycles for payments due from our customers, an increase in customer bad debt, restructuring initiatives and associated expenses, and impairment of investments. Furthermore, instability in the global markets may adversely impact the ability of our customers to adequately fund their expected expenditures, which could lead to delays or cancellations of planned purchases of our products or services. Our operating expenses are largely based on anticipated revenue trends and a high percentage of our expenses is, and will continue to be, fixed in the short and medium term. Uncertainty about future economic conditions also makes it difficult to forecast operating results and to make decisions about future investments. Future or continued economic weakness, failure of our customers and markets to recover from such weakness, customer financial difficulties, increases in costs of production, and reductions in spending on network maintenance and expansion could result in price concessions in certain markets or have a material adverse effect on demand for our products and consequently on our business, financial condition, and results of operations.

Our success depends upon our ability to effectively plan and manage our resources and restructure our business through rapidly fluctuating economic and market conditions, and such actions may have an adverse effect on our financial and operating results.

Our ability to successfully offer our products and services in a rapidly evolving market requires an effective planning, forecasting, and management process to enable us to effectively scale and adjust our business and business models in response to fluctuating market opportunities and conditions.

From time to time, we have increased investment in our business by, for example, increasing headcount, acquiring companies, and increasing our investment in R&D, sales and marketing, and other parts of our business. Conversely, in 2017, 2018, and 2019, we initiated restructuring plans to realign our workforce as a result of organizational and leadership changes, align our execution priorities, increase operational efficiencies, and to consolidate facilities which resulted in restructuring charges in each of these years. Some of our expenses related to such efforts are fixed costs that cannot be rapidly or easily adjusted in response to fluctuations in our business or numbers of employees. Rapid changes in the size, alignment or organization of our workforce, including sales account coverage, could adversely affect our ability to develop and deliver products and services as planned or impair our ability to realize our current or future business and financial objectives. Our ability to achieve the anticipated cost savings and other benefits from our restructuring initiatives within the expected time frame is subject to many estimates and assumptions, which are subject to significant economic, competitive and other uncertainties, some of which are beyond our control. If these estimates and assumptions are incorrect, if we are unsuccessful at implementing changes, or if other unforeseen events occur, our business and results of operations could be adversely affected.

We face intense competition that could reduce our revenues and adversely affect our business and financial results.

Competition is intense in the markets that we serve. The routing and switching markets have historically been dominated by Cisco, with competition coming from other companies such as Nokia Corporation, Arista, HPE, and Huawei. In the security market, we face intense competition from Cisco and Palo Alto Networks, as well as companies such as Check Point, F5 Networks, and Fortinet. Further, a number of other small public and private companies have products or have announced plans for new products to address the same challenges and markets that our products address.

In addition, actual or speculated consolidation among competitors, or the acquisition by, or of, our partners and/or resellers by competitors can increase the competitive pressures faced by us as customers may delay spending decisions or not purchase our products at all. A number of our competitors have substantially greater resources and can offer a wider range of products and services for the overall network equipment market than we do. In addition, some of our competitors have become more integrated, including through consolidation and vertical integration, and offer a broader range of products and services, which could make their solutions more attractive to our customers. Many of our competitors sell networking products as bundled solutions with other IT products, such as compute and storage systems. If we are unable to compete successfully against existing and future competitors on the basis of product offerings or price, we could experience a loss in market share and revenues and/or be required to reduce prices, which could reduce our gross margins, and which could materially and adversely affect our business, financial condition, and results of operations. Our partners and resellers generally sell or resell competing products on a non-exclusive basis and consolidation could delay spending or require us to increase discounts to compete, which could also adversely affect our business.

The long sales and implementation cycles for our products, as well as our expectation that some customers will sporadically place large orders with short lead times, may cause our revenues and operating results to vary significantly from quarter-to-quarter.

A customer's decision to purchase certain of our products, particularly new products, involves a significant commitment of its resources and a lengthy evaluation and product qualification process. As a result, the sales cycle may be lengthy. In particular, customers making critical decisions regarding the design and implementation of large network deployments may engage in very lengthy procurement processes that may delay or impact expected future orders. Throughout the sales cycle, we may spend considerable time educating and providing information to prospective customers regarding the use and benefits of our products. Even after making the decision to purchase, customers may deploy our products slowly and deliberately. Timing of deployment can vary widely and depends on the skill set of the customer, the size of the network deployment, the complexity of the customer's network environment, and the degree of hardware and operating system configuration necessary to deploy the products. Customers with large networks usually expand their networks in large increments on a periodic basis. Accordingly, we may receive purchase orders for significant dollar amounts on an irregular basis. These long cycles, as well as our expectation that customers will tend to sporadically place large orders with short lead times, both of which may be exacerbated by the impact of global economic weakness, may cause revenues and operating results to vary significantly and unexpectedly from quarter-to-quarter.

The timing of product orders and/or our reliance on revenue from sales of certain software or subscriptions and professional, support and maintenance services may cause us to recognize revenue in a different period than the one in which a transaction takes place.

Due to the cost, complexity and custom nature of configurations required by our customers, we generally build our network equipment products as orders are received. The volume of orders received late in any given fiscal quarter remains unpredictable. If orders for certain products are received late in any quarter, we may not be able to recognize revenue for these orders in the same period, which could adversely affect our ability to meet our expected revenues for such quarter.

In addition, services revenue accounts for a significant portion of our revenue, comprising 33%, 31%, and 29% of total revenue in fiscal year 2018, 2017, and 2016, respectively. Sales of new or renewal professional services, support and maintenance contracts may decline and/or fluctuate as a result of a number of factors, including end-customers' level of satisfaction with our products and services, the prices of our products and services or those offered by our competitors, and reductions in our end-customers' spending levels. We recognize professional services, support and maintenance revenue periodically over the term of the relevant service period.

The introduction of new software products and services is part of our intended strategy to expand our software business, and certain software revenues may be recognized periodically over the term of the relevant use period or subscription period. As a result, certain software, subscription and support and maintenance revenue we report each fiscal quarter is the recognition of deferred revenue from contracts entered into during previous fiscal quarters. Consequently, a decline in such new or renewed contracts in any one fiscal quarter will not be fully or immediately reflected in revenue in that fiscal quarter but will negatively affect our revenue in future fiscal quarters. Accordingly, the effect of significant downturns in new or renewed sales of certain software products, subscriptions or support and maintenance is not reflected in full in our operating results until future periods. Also, it is difficult for us to rapidly increase such software or services revenue through additional sales in any period, as revenue from those software, subscription and support and maintenance contracts must be recognized over the applicable period.

Additionally, we determine our operating expenses largely on the basis of anticipated revenues and technology roadmap and a high percentage of our expenses are fixed in the short and medium term. As a result, a failure or delay in generating or recognizing revenue could cause significant variations in our operating results and operating margin from quarter-to-quarter.

We sell our products to customers that use those products to build networks and IP infrastructure, and if the demand for network and IP systems does not continue to grow, our business, financial condition, and results of operations could be adversely affected.

A substantial portion of our business and revenues depends on the growth of secure IP infrastructure and customers that depend on the continued growth of IP services to deploy our products in their networks and IP infrastructures. As a result of changes in the economy, capital spending or the building of network capacity in excess of demand (all of which, have in the past, particularly affected telecommunications service providers), spending on IP infrastructure can vary, which could have a material adverse effect on our business, financial condition, and results of operations. In addition, a number of our existing customers are evaluating the build-out of their next generation networks. During the decision-making period when our customers are determining the design of those networks and the selection of the software and equipment they will use in those networks, such customers may greatly reduce or suspend their spending on secure IP infrastructure. For example, in recent years, our switching and routing results were adversely affected by spending delays from our largest Cloud customers, who we believe are in the process of implementing a networking architectural shift. The duration of the delay is difficult to predict, in part because each Cloud customer will migrate their network architecture based on their own constraints. Such delays in purchases can make it more difficult to predict revenues from customers, can cause fluctuations in the level of spending by customers and, even where our products are ultimately selected, can have a material adverse effect on our business, financial condition, and results of operations.

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If we do not successfully anticipate technological shifts, market needs and opportunities, and develop products, product enhancements and business strategies that meet those technological shifts, needs and opportunities, or if those products are not made available or strategies are not executed in a timely manner or do not gain market acceptance, we may not be able to compete effectively and our ability to generate revenues will suffer.

The markets for our products are characterized by rapid technological change, frequent new product introductions, changes in customer requirements, continuous pricing pressures and a constantly evolving industry. We may not be able to anticipate future technological shifts, market needs and opportunities or be able to develop new products, product enhancements or business strategies to meet such technological shifts, needs or opportunities in a timely manner or at all. For example, the move from traditional wide area network, or WAN, infrastructures towards software-defined WAN, or SD-WAN, has been receiving considerable attention. In our view, it will take several years to see the full impact of SD-WAN, and we believe the successful products and solutions in this market will combine hardware and software elements. If we fail to anticipate market requirements or opportunities or fail to develop and introduce new products, product enhancements or business strategies to meet those requirements or opportunities in a timely manner, it could cause us to lose customers, and such failure could substantially decrease or delay market acceptance and sales of our present and future products and services, which would significantly harm our business, financial condition, and results of operations. In addition, if we invest time, energy and resources in developing products for a market that doesn't develop, it could likewise significantly harm our business, financial condition, and results of operations. Even if we are able to anticipate, develop, and commercially introduce new products, enhancements or business strategies, there can be no assurance that new products, enhancements or business strategies will achieve widespread market acceptance.

In recent years, we have announced a number of new products and enhancements to our hardware and software products across routing, switching and security. The success of our new products depends on several factors, including, but not limited to, component costs, timely completion and introduction of these products, prompt resolution of any defects or bugs in these products, our ability to support these products, differentiation of new products from those of our competitors and market acceptance of these products.

The introduction of new software products is part of our intended strategy to expand our software business. We have also begun to disaggregate certain software from certain hardware products, such that customers would be able to purchase or license our hardware and software products independently, which we expect could in time enable our hardware to be deployed with third- party networking applications and services and our software to be used with third-party hardware. The success of our strategy to expand our software business, including our strategy to disaggregate software from certain hardware products, is subject to a number of risks and uncertainties, including:

- the additional development efforts and costs required to create new software products and/or to make our disaggregated products compatible with multiple technologies;

- the possibility that our new software products or disaggregated products may not achieve widespread customer adoption;

- the possibility that our strategy could erode our revenue and gross margins;

- the impact on our financial results of longer periods of revenue recognition for certain types of software products and changes in tax treatment associated with software sales;

- the additional costs associated with regulatory compliance and changes we need to make to our distribution chain in connection with increased software sales;

- the ability of our disaggregated hardware and software products to operate independently and/or to integrate with current and future third-party products; and

- issues with third-party technologies used with our disaggregated products may be attributed to us.

If any of our new products or business strategies do not gain market acceptance or meet our expectations for growth, our ability to meet future financial targets may be adversely affected and our competitive position and our business and financial results could be harmed.

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We are dependent on contract manufacturers with whom we do not have long-term supply contracts, and changes to or disruptions in those relationships or manufacturing processes, expected or unexpected, may result in delays that could cause us to lose revenues and damage our customer relationships.

We depend on independent contract manufacturers (each of which is a third-party manufacturer for numerous companies) to manufacture our products. Although we have contracts with our contract manufacturers, these contracts do not require them to manufacture our products on a long-term basis in any specific quantity or at any specific price. In addition, it is time-consuming and costly to qualify and implement additional contract manufacturer relationships. Therefore, if we fail to effectively manage our contract manufacturer relationships, which could include failing to provide accurate forecasts of our requirements, or if one or more of them experiences delays, disruptions, or quality control problems in their manufacturing operations, or if we had to change or add additional contract manufacturers or contract manufacturing sites, our ability to ship products to our customers could be delayed. We have experienced in the past and may experience in the future an increase in the expected time required to manufacture our products or ship products. Such delays could result in supply shortfalls that damage our ability to meet customer demand for those products and could cause our customers to purchase alternative products from our competitors. Also, the addition of manufacturing locations or contract manufacturers or the introduction of new products by us would increase the complexity of our supply chain management. Moreover, a significant portion of our manufacturing is performed in China and other foreign countries and is therefore subject to risks associated with doing business outside of the United States, including import tariffs or regional conflicts. For example, the United States recently imposed a tariff on networking products imported from China; this includes certain products that we import into and sell within the United States. If we cannot mitigate the impact of the tariffs, the increased cost could translate into higher prices for our customers, reduced customer demand or increased cost of goods sold. In addition, increased costs of production or delays in production caused by any relocation of contract manufacturing facilities could impact the global competitiveness of our products. Each of these factors could adversely affect our business, financial condition and results of operations.

We are dependent on sole source and limited source suppliers, including for key components, which makes us susceptible to shortages, quality issues or price fluctuations in our supply chain, and we may face increased challenges in supply chain management in the future.

We rely on single or limited sources for many of our components. During periods of high demand for electronic products, component shortages are possible, and the predictability of the availability of such components may be limited. For example, we have recently experienced industry-wide supply constraints related to power management components. In addition, some components used in our networking solutions have in the past and may in the future experience extended lead times and higher pricing, given the demand in the market. Any future spike in growth in our business, the use of certain components we share in common with other companies, in IT spending or the economy in general, is likely to create greater short-term pressures on us and our suppliers to accurately forecast overall component demand and to establish optimal component inventories. If shortages or delays persist, we may not be able to secure enough components at reasonable prices or of acceptable quality to build and deliver products in a timely manner, and our revenues, gross margins and customer relationships could suffer. Additionally, if certain components that we receive from our suppliers have defects or other quality issues, we may have to replace or repair such components, and we could be subject to claims based on warranty, product liability, epidemic or delivery failures that could lead to significant expenses. We maintain product liability insurance, but there is no guarantee that such insurance will be available or adequate to protect against all such claims. We have experienced, and from time-to-time may experience, component shortages or quality issues that resulted, or could result, in delays of product shipments, revenue charges that impact our gross margins, and/or warranty or other claims or costs. We also currently purchase numerous key components, including ASICs and other semiconductor chips, from single or limited sources and many of our component suppliers are concentrated in China and Korea. In addition, there has been consolidation among certain suppliers of our components. For example, GLOBALFOUNDRIES acquired IBM's semiconductor manufacturing business, Avago Technologies Limited acquired Broadcom Corporation and Intel Corporation acquired Altera Corporation. Consolidation among suppliers can result in the reduction of the number of independent suppliers of components available to us, which could negatively impact our ability to access certain component parts or the prices we have to pay for such parts. In addition, our suppliers may determine not to continue a business relationship with us for other reasons that may be beyond our control. Any disruptions to our supply chain could decrease our sales, earnings and liquidity or otherwise adversely affect our business and result in increased costs. Such a disruption could occur as a result of any number of events, including, but not limited to, increases in wages that drive up prices, the imposition of regulations, quotas or embargoes on components, labor stoppages, transportation failures affecting the supply chain and shipment of materials and finished goods, third-party interference in the integrity of the products sourced through the supply chain, the unavailability of raw materials, severe weather conditions, natural disasters, civil unrest, military conflicts, geopolitical developments, war or terrorism and disruptions in utility and other services.

The development of alternate sources for components is time-consuming, difficult, and costly. In addition, the lead times associated with certain components are lengthy and preclude rapid changes in quantities and delivery schedules. Also, long-term supply and maintenance obligations to customers increase the duration for which specific components are required, which may further increase

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the risk of component shortages or the cost of carrying inventory. In the event of a component shortage or supply interruption from these suppliers, we may not be able to develop alternate or second sources in a timely manner. If we are unable to buy these components in quantities sufficient to meet our requirements on a timely basis, we will not be able to deliver products and services to our customers, which would seriously affect present and future sales, which would, in turn, adversely affect our business, financial condition, and results of operations.

In addition, the development, licensing, or acquisition of new products in the future may increase the complexity of supply chain management. Failure to effectively manage the supply of components and products would adversely affect our business.

If we fail to accurately predict our manufacturing requirements, we could incur additional costs or experience manufacturing delays, which would harm our business.

We provide demand forecasts for our products to our contract manufacturers and original design manufacturers, who order components and plan capacity based on these forecasts. If we overestimate our requirements, our original design or contract manufacturers may assess charges, or we may have liabilities for excess inventory, each of which could negatively affect our gross margins. For example, in certain prior quarters, our gross margins were reduced as a result of an inventory charge resulting from inventory we held in excess of forecasted demand. In addition, some optical modules we use are experiencing faster product transitions than our other products, which increases the risk that we could have excess inventory of those modules. Conversely, lead times for required materials and components vary significantly and depend on factors such as the specific supplier, contract terms, and the demand for each component at a given time. Given that our contract manufacturers are third-party manufacturers for numerous other companies, if we underestimate our requirements, as we have in certain prior quarters with respect to certain products, our contract manufacturers may have inadequate time, materials, and/or components required to produce our products. This could increase costs or delay or interrupt manufacturing of our products, resulting in delays in shipments and deferral or loss of revenues and could negatively impact customer satisfaction.

System security risks, data protection breaches, and cyber-attacks could compromise our and our customers' proprietary information, disrupt our internal operations and harm public perception of our products, which could cause our business and reputation to suffer and adversely affect our stock price.

In the ordinary course of business, we store sensitive data, including intellectual property, personal data, our proprietary business information and that of our customers, suppliers and business partners on our networks. In addition, we store sensitive data through cloud-based services that may be hosted by third parties and in data center infrastructure maintained by third parties. The secure maintenance of this information is critical to our operations and business strategy. The growing cyber risk environment means that individuals, companies, and organizations of all sizes, including Juniper, have been and are increasingly subject to the threat of intrusions on their networks and systems by a wide range of actors, including but not limited to nation states, criminal enterprises, and terrorist organizations, on an ongoing and regular basis. Despite our security measures, and those of our third-party vendors, our information technology and infrastructure has experienced breaches and may be vulnerable in the future to breach or attacks by computer programmers, hackers or sophisticated nation-state and nation-state supported actors or breached due to employee error or wrongful conduct, malfeasance, or other disruptions. If any breach or attack compromises our networks, creates system disruptions or slowdowns or exploits security vulnerabilities of our products, the information stored on our networks or those of our customers could be accessed and modified, publicly disclosed, lost or stolen, and we may be subject to liability to our customers, suppliers, business partners and others, and suffer reputational and financial harm. In addition, hardware, components and operating system software and applications that we produce or procure from third parties may contain defects in design or manufacture, including "bugs", vulnerabilities and other problems that could unexpectedly interfere with the operation of our networks or expose us or our products to cyber attacks. This can be true even for "legacy" products that have been determined to have reached an end of life engineering status but will continue to operate for a limited amount of time. Furthermore, third parties may attempt to exfiltrate data through the introduction into the Information and Communications Technology supply chain of malicious products and components that are designed to defeat or circumvent encryption and other cybersecurity measures, and if successful, such actions could diminish customer trust in our products, harm our business reputation, and adversely affect our business and financial condition.

When vulnerabilities are discovered, we evaluate the risk, apply patches or take other remediation actions as required and notify customers and suppliers when appropriate. All of this requires significant time and attention from management and our employees.

As a result of any actual or perceived breach of network security that occurs in our network or in the network of a customer of our products, regardless of whether the breach is attributable to our products, the market perception of the effectiveness of our products and our overall reputation could be harmed. As a large, well known provider of networking products, cyber attackers may specifically target our products or attempt to imitate us or our products in order to compromise a network. Because the techniques used by attackers, many of whom are highly sophisticated and well-funded, to access or sabotage networks change

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frequently and generally are not recognized until after they are used, we may be unable to anticipate or immediately detect these techniques or the vulnerabilities they have caused. This could impede our sales, manufacturing, distribution or other critical functions, which could have an adverse impact on our financial results. The economic costs to us to eliminate or alleviate cyber or other security problems, bugs, viruses, worms, malicious software systems and security vulnerabilities could be significant and may be difficult to anticipate or measure, because the damage may differ based on the identity and motive of the attacker, which are often difficult to pinpoint. Additionally, we could be subject to regulatory investigations, potential fines and litigation in connection with a security breach or related issue and be liable to third parties for these types of breaches.

We rely on value-added and other resellers, as well as distribution partners, to sell our products, and disruptions to, or our failure to effectively develop and manage, our distribution channel and the processes and procedures that support it could adversely affect our ability to generate revenues from the sale of our products.

Our future success is highly dependent upon establishing and maintaining successful relationships with a variety of value-added and other reseller and distribution partners, including our worldwide strategic partners such as Ericsson, IBM, Dimension Data and NEC Corporation. The majority of our revenues are derived through value-added resellers and distributors, most of which also sell our competitors' products, and some of which sell their own competing products. Our revenues depend in part on the performance of these partners. The loss of or reduction in sales to our resellers or distributors could materially reduce our revenues. Our competitors may in some cases be effective in leveraging their market share positions or in providing incentives to current or potential resellers and distributors to favor their products or to prevent or reduce sales of our products. If we fail to develop and maintain relationships with our partners, fail to develop new relationships with value-added resellers and distributors in new markets, fail to expand the number of distributors and resellers in existing markets, fail to manage, train or motivate existing value-added resellers and distributors effectively, determine that we cannot continue to do business with these partners for any reason or if these partners are not successful in their sales efforts, sales of our products may decrease, and our business, financial condition, and results of operations would suffer.

In addition, we recognize a portion of our revenues at the time we sell products to our distributors. If these sales are made based on inaccurate or untimely information, the amount or timing of our revenues could be adversely impacted. Further, our distributors may increase orders during periods of product shortages, cancel orders if their inventory is too high, or delay orders in anticipation of new products. They also may adjust their orders in response to the supply of our products and the products of our competitors that are available to them, and in response to seasonal fluctuations in end-user demand.

We are also vulnerable to third parties who illegally distribute or sell counterfeit, stolen or unfit versions of our products, which has happened in the past and could happen in the future. Such sales could have a negative impact on our reputation and business.

Further, in order to develop and expand our distribution channel, we must continue to offer attractive channel programs to potential partners and scale and improve our processes and procedures that support the channel. As a result, our programs, processes and procedures may become increasingly complex and inherently difficult to manage. We have previously entered into OEM agreements with partners pursuant to which they rebrand and resell our products as part of their product portfolios. These types of relationships are complex and require additional processes and procedures that may be challenging and costly to implement, maintain and manage. Our failure to successfully manage and develop our distribution channel and the programs, processes and procedures that support it could adversely affect our ability to generate revenues from the sale of our products. We also depend on our global channel partners to comply with applicable legal and regulatory requirements. To the extent that they fail to do so, that could have a material adverse effect on our business, operating results, and financial condition.

Our ability to process orders and ship products in a timely manner is dependent in part on our business systems and performance of the systems and processes of third parties as well as the interfaces between our systems and the systems of such third parties. Dependence on outsourced information technology and other administrative functions may impair our ability to operate effectively.

Some of our business processes depend upon our IT systems, the systems and processes of third parties, and the interfaces between the two. For example, we are in the process of further consolidating our on-site data centers to the cloud and to off-site facilities that are hosted and controlled by third parties. In addition, on December 31, 2018, we entered into a Master Services Agreement and certain Statements of Work with IBM pursuant to which we will outsource significant portions of our IT and other administrative functions following a transition period. These cloud providers, third party providers, and off-site facilities are vulnerable to damage, interruption or performance problems from earthquakes, hurricanes, floods, fires, power loss, telecommunications failures, equipment failure, adverse events caused by operator error, cybersecurity attacks and similar events. In addition, because we lease our cloud storage space and off-site data center facilities, we cannot be assured that we will be able to expand our data center infrastructure to meet user demand in a timely manner, or on favorable economic terms. If we have issues receiving and processing

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data, this may delay our ability to provide products and services to our customers and damage our business. We also rely upon the performance of the systems and processes of our contract manufacturers to build and ship our products. If those systems and processes experience interruption or delay, our ability to build and ship our products in a timely manner may be harmed. Since IT is critical to our operations, any failure to perform on the part of our IT providers could impair our ability to operate effectively. In addition to the risks outlined above, problems with any of the third parties we rely on for our IT systems could result in lower revenue and unexecuted efficiencies, and impact our results of operations and our stock price.

Integration of acquisitions could disrupt our business and harm our financial condition and stock price and may dilute the ownership of our stockholders.

We have made, and may continue to make, acquisitions in order to enhance our business. For example, we acquired HTBase in 2018 and Cyphort in 2017. Acquisitions involve numerous risks, including, but not limited to, problems combining the purchased operations, technologies or products, unanticipated costs, liabilities, litigation, and diversion of management's attention from our core businesses, adverse effects on existing business relationships with suppliers and customers, risks associated with entering markets in which we have no or limited prior experience, and where competitors in such markets have stronger market positions, initial dependence on unfamiliar supply chains or relatively small supply partners, and the potential loss of key employees, customers, distributors, vendors and other business partners of the companies we acquire. There can be no assurance that we will be able to integrate successfully any businesses, products, technologies, or personnel that we might acquire. The integration of businesses that we may acquire is likely to be a complex, time-consuming, and expensive process and we may not realize the anticipated revenues or other benefits associated with our acquisitions. If we fail to successfully manage, operate or integrate any acquired business or if we are unable to efficiently operate as a combined organization utilizing common information and communication systems, operating procedures, financial controls, and human resources practices, our business, financial condition, and results of operations may be adversely affected.

In connection with certain acquisitions, we may agree to issue common stock , or assume equity awards, that dilute the ownership of our current stockholders, use a substantial portion of our cash resources, assume liabilities (both known and unknown), record goodwill and amortizable intangible assets that will be subject to impairment testing on a regular basis and potential periodic impairment charges, incur amortization expenses related to certain intangible assets, and incur large and immediate write-offs and restructuring and other related expenses, all of which could harm our financial condition and results of operations.

We are a party to lawsuits, investigations, proceedings, and other disputes, which are costly to defend and, if determined adversely to us, could require us to pay fines or damages, undertake remedial measures or prevent us from taking certain actions, any or all of which could harm our business, results of operations, financial condition or cash flows.

We, and certain of our current and former officers and current and former members of our Board of Directors, have been or are subject to various lawsuits. We have been served with lawsuits related to employment matters, commercial transactions and patent infringement, as well as securities laws. The U.S. Securities and Exchange Commission, or the SEC, is conducting, and the U.S. Department of Justice, or the DOJ, was previously conducting investigations into possible violations by the Company of the U.S. Foreign Corrupt Practices Act, or the FCPA, in a number of countries. The Company's Audit Committee, with the assistance of independent advisors, conducted a thorough internal review of possible violations of the FCPA, and the Company made improvements in its internal controls and carried out a number of disciplinary actions. The Company is continuing to fully cooperate with the SEC’s ongoing investigation, and based on the recent communications with the Staff of the SEC, the Company believes it is likely that the Staff of the SEC will seek to bring an enforcement action against the Company. The Company believes it is probable that it could incur a loss and has established an estimated legal reserve of $12.0 million related to the ongoing SEC investigation. Litigation and investigations are inherently uncertain. We therefore cannot predict the duration, scope, outcome or consequences of litigation and government investigations. In connection with any government investigations, including those in which we are currently involved as described above, if the government takes action against us or we agree to settle the matter, we may be required to pay substantial fines and incur other sanctions, which may be material, and suffer reputational harm. The lawsuits and investigations are expensive and time-consuming to defend, settle, and/or resolve, and may require us to implement certain remedial measures that could prove costly or disruptive to our business and operations. The unfavorable resolution of one or more of these matters could have a material adverse effect on our business, results of operations, financial condition or cash flows.

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We are a party to litigation and claims regarding intellectual property rights, resolution of which may be time-consuming and expensive, as well as require a significant amount of resources to prosecute, defend, or make our products non-infringing.

Our industry is characterized by the existence of a large number of patents and frequent claims and related litigation regarding patent and other intellectual property rights. We expect that infringement claims may increase as the number of products and competitors in our market increases and overlaps occur. Third parties have asserted and may in the future assert claims or initiate litigation related to patent, copyright, trademark, and other intellectual property rights to technologies and related standards that are relevant to our products. The asserted claims and/or initiated litigation may include claims against us or our manufacturers, suppliers, partners, or customers, alleging that our products or services infringe proprietary rights. In addition, increased patent litigation brought by non-practicing entities in recent years may result, and in some cases has resulted, in our customers requesting or requiring us to absorb a portion of the costs of such litigation or providing broader indemnification for litigation, each of which could increase our expenses and negatively affect our business, financial condition and results of operations. Regardless of the merit of these claims, they have been and can be time-consuming, result in costly litigation, and may require us to develop non-infringing technologies, enter into license agreements, or cease engaging in certain activities or offering certain products or services. Furthermore, because of the potential for high awards of damages or injunctive relief that are not necessarily predictable, even arguably unmeritorious claims may be settled for significant amounts of money. If any infringement or other intellectual property claim made against us or anyone we are required to indemnify by any third-party is successful, if we are required to settle litigation for significant amounts of money, if we fail to develop non-infringing technology, if we incorporate infringing technology in our products or if we license required proprietary rights at material expense, our business, financial condition, and results of operations could be materially and adversely affected.

As we seek to sell more products to telecommunications, cable and cloud service provider companies and other large customers, we may be required to agree to terms and conditions that could have an adverse effect on our business or impact the amount of revenues to be recognized.

Telecommunications, cable and cloud service provider companies, which comprise a significant portion of our customer base, and other large companies, generally have greater purchasing power than smaller entities and, accordingly, often request and receive more favorable terms from suppliers. For example, our customers France Telecom-Orange and Deutsche Telekom AG have formed a company for the purpose of purchasing products from, and negotiating more favorable contractual terms with, suppliers. As we seek to sell more products to this class of customer, we may be required to agree to such terms and conditions, which may include terms that affect the timing of our ability to recognize revenue, increase our costs and have an adverse effect on our business, financial condition, and results of operations. Consolidation among such large customers can further increase their buying power and ability to require onerous terms.

In addition, service providers have purchased products from other vendors who promised but failed to deliver certain functionality and/or had products that caused problems or outages in the networks of these customers. As a result, these customers may request additional features from us and require substantial penalties for failure to deliver such features or may require substantial penalties for any network outages that may be caused by our products. These additional requests and penalties, if we are required to agree to them, may impact the amount of revenue recognition from such sales, which may negatively affect our business, financial condition and results of operations. In addition, increased patent litigation brought against customers by non-practicing entities in recent years, may result, and in some cases has resulted, in customers requesting or requiring vendors to absorb a portion of the costs of such litigation or providing broader indemnification for litigation, each of which could increase our expenses and negatively affect our business, financial condition and results of operations.

Regulation of our industry in general and the telecommunications industry in particular could harm our operating results and future prospects.

We are subject to laws and regulations affecting the sale of our products in a number of areas. For example, some governments have regulations prohibiting government entities from purchasing security products that do not meet country-specific safety, conformance or security certification criteria or in-country test requirements. Other regulations that may negatively impact our business include local content or local manufacturing requirements most commonly applicable for government, state-owned enterprise or regulated industry procurements. These types of regulations are in effect or under consideration in several jurisdictions where we do business.

The Dodd-Frank Wall Street Reform and Consumer Protection Act includes disclosure requirements applicable to public companies regarding the use of “conflict minerals” mined from the Democratic Republic of Congo and adjoining countries, which we refer to collectively as the DRC, and procedures regarding a manufacturer's efforts to prevent the sourcing of such “conflict minerals.” These minerals are present in our products. In addition, the European Union reached agreement in late 2016 on a EU-wide conflict minerals rule under which most EU importers of tin, tungsten, tantalum, gold and their ores will have to conduct due diligence to

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ensure the minerals do not originate from conflict zones and do not fund armed conflicts. Large manufacturers also will have to disclose how they plan to monitor their sources to comply with the rules. The regulation was adopted in 2017 with compliance required by 2021.

In addition, environmental laws and regulations relevant to electronic equipment manufacturing or operations, including laws and regulations governing the hazardous material content of our products and laws relating to the collection of and recycling of electrical and electronic equipment, may adversely impact our business and financial condition. These laws and regulations include, among others, the European Union, or EU, Restriction on the Use of Certain Hazardous Substances Directive, or RoHS. The EU RoHS and the similar laws of other jurisdictions limit the content of certain hazardous materials, such as lead, mercury, and cadmium, in electronic equipment, including our products. Currently, our products comply with the EU RoHS requirements. However, certain exemptions are scheduled to lapse. The lapse of any exemption, further changes to this or other laws, or passage of similar laws in the EU or other jurisdictions, would require us to cease selling non-compliant products and to reengineer our products to use components compatible with these regulations. This reengineering and component substitution could result in additional costs to us, disrupt our operations or logistics, and result in an adverse impact on our operating results. In addition, in validating the compliance of our products with applicable hazardous materials restrictions, we rely substantially on affirmations by our component suppliers as to the compliance of their products with respect to those same restrictions. Failure by our component suppliers to furnish accurate and timely information could subject us to penalties or liability for violation of such hazardous materials restrictions, interrupt our supply of products to the EU, and result in our customers refusing or being unable to purchase our products. Additionally, the EU and a number of other jurisdictions have adopted regulations requiring producers of electrical and electronic equipment to assume certain responsibilities for collecting, treating, recycling and disposing of products when they have reached the end of their useful life. Finally, the EU REACH regulations regulate the handling of certain chemical substances that may be used in our products.

In addition, as a contractor and subcontractor to U.S. government departments and agencies, we are subject to federal regulations pertaining to our IT systems. For instance, as a subcontractor to the U.S. Department of Defense, or DOD, the Defense Federal Acquisition Regulation Supplement, or DFARS, required that our IT systems comply with the security and privacy controls described in National Institute of Standards and Technology Special Publication 800-171, or NIST SP 800-171. The DFARS also requires that we flow the security control requirement down to certain of our own subcontractors. Failure to comply with these requirements could result in a loss of federal government business, subject us to claims or other remedies for non-compliance and negatively impact our business, financial condition, and results of operations.

The telecommunications industry is highly regulated, and our business and financial condition could be adversely affected by changes in regulations relating to the Internet telecommunications industry. Similarly, while there are currently few laws or regulations that apply directly to access to or commerce on IP networks, future regulations could include sales taxes on products sold via the Internet and Internet service provider access charges. We could be adversely affected by regulation of IP networks and commerce in any country where we market equipment and services to service providers or cloud provider companies. Regulations governing the range of services and business models that can be offered by service providers or cloud provider companies could adversely affect those customers' needs for products. For instance, in December 2017, the U.S. Federal Communications Commission repealed its 2015 regulations governing aspects of fixed broadband networks and wireless networks. This change in regulatory treatment of networks might impact service provider and cloud provider business models and their need for Internet telecommunications equipment and services. At the same time, several states have enacted their own laws and regulations governing certain aspects of fixed and wireless networks in the manner of the 2015 FCC regulations. These laws and regulations enacted by the states are or will be subject to legal challenges from the federal government and/or regulated providers. Also, many jurisdictions are evaluating or implementing regulations relating to cyber security, supply chain integrity, privacy and data protection, any of which can affect the market and requirements for networking and security equipment.

The adoption and implementation of additional regulations could reduce demand for our products, increase the cost of building and selling our products, result in product inventory write-offs, impact our ability to ship products into affected areas and recognize revenue in a timely manner, require us to spend significant time and expense to comply, and subject us to fines and civil or criminal sanctions or claims if we were to violate or become liable under such regulations. Any of these impacts could have a material adverse effect on our business, financial condition, and results of operations.

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Governmental regulations and economic sanctions affecting the import or export of products generally or affecting products containing encryption capabilities in particular, could negatively affect our revenues and operating results.

The United States and various foreign governments have imposed controls and restrictions on the export of, among other things, products that contain or use encryption technology. Most of our products contain or use encryption technology and, consequently, are subject to such controls, requirements and restrictions. Certain governments, like those of Russia and China, control importation and in-country use of encryption items and technology. The scope, nature and severity of such controls vary widely across different countries and may change frequently over time.

Increasingly, governments have begun using export and import controls not only to further national security objectives but also to protect local industries and restrict proliferation of locally developed “emerging or foundational technology." For example, in 2018 the U.S. enacted the Export Control Reform Act, which expands the power of the Commerce Department to use export controls to protect domestic industry and to restrict the export of emerging and foundational technologies not currently subject to controls. In furtherance of that law, on November 19, 2018, the United States Department of Commerce sought public comment on how to define emerging technologies. Our ability to market and sell our products overseas may be impacted by such export controls.

Certain governments also impose special local content, certification, testing, source code review, escrow and governmental recovery of private encryption keys, or feature requirements on cybersecurity and other network equipment for purposes of government procurements. Similar requirements also may be imposed in procurements by state owned entities (“SOE’s”) or even private companies forming part of “critical network infrastructure” or supporting sensitive industries. For example, China, Vietnam and India have promulgated cybersecurity regulations affecting networking products that may impair our ability to profitably market and sell our products there. China, in particular, is expected to require implementation of non-standard Chinese encryption algorithms in products sold into certain government, SOE, critical infrastructure and sensitive industry (such as financial institutions) markets. In the U.S., there are new restrictions on the use of certain Chinese-origin components or systems in items sold to the U.S. government.

In addition, the U.S. and other governments have especially broad sanctions and embargoes prohibiting provision of goods or services to certain countries, and territories, and to certain sanctioned governments, legal entities and individuals. Some of these restrictions have been imposed not just to protect national security but also to protect domestic industries and to achieve political aims. For instance, the U.S. Department of Commerce in 2018 added to its Entity List a Chinese semiconductor manufacturer on the express basis that it threatens the viability of U.S. competitors; the Entity List traditionally is used to restrict exports to end users that pose a security risk. Particularly far reaching and complex are restrictions imposed by the U.S. and EU on exports to Russia and, in particular, to the disputed region of Crimea. We have implemented systems to detect and prevent sales into these restricted countries or to prohibited entities or individuals, but there can be no assurance that our third party, downstream resellers and distributors will abide by these restrictions or have processes in place to ensure compliance, especially where local government regulation might prohibit adherence to such restrictions.

In addition, governments sometimes impose additional taxes on certain imported products. For example, the United States and Chinese governments each have imposed tariffs on certain products originating from the other country. In 2018, the United States, for example, imposed tariffs on a large variety of products of China origin. As a result, beginning September 24, 2018, a large portion of Juniper products manufactured in China became subject to a 10% tariff on importation into the U.S. That tariff rate may increase to 25% on March 2, 2019, absent satisfactory outcome of continuing negotiations between the United States and China. The U.S. President has also indicated a readiness to further expand the scope of the tariffs on Chinese goods if negotiations are not successful; such action could subject an even wider range of Juniper products to tariff on importation into the U.S. Depending upon its duration and implementation, as well as our ability to mitigate their impact, these tariffs could materially affect our business, including in the form of increased cost of goods sold, increased pricing for customers, and reduced sales.

Governmental regulation of encryption or IP networking technology and regulation of imports or exports, or our failure to obtain required import or export approval for our products, or related economic sanctions could harm our international and domestic sales and adversely affect our revenues and operating results. In addition, failure to comply with such regulations could result in harm to our reputation and ability to compete in international markets, penalties, costs, seizure of assets (including source code) and restrictions on import or export privileges or adversely affect sales to government agencies or government-funded projects.

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Our actual or perceived failure to adequately protect personal data could adversely affect our business, financial condition and results of operations.

A wide variety of provincial, state, national, foreign, and international laws and regulations apply to the collection, use, retention, protection, disclosure, transfer, and other processing of personal data. These privacy- and data protection-related laws and regulations are evolving, with new or modified laws and regulations proposed and implemented frequently and existing laws and regulations subject to new or different interpretations. Further, our legal and regulatory obligations in foreign jurisdictions are subject to unexpected changes, including the potential for regulatory or other governmental entities to enact new or additional laws or regulations, to issues rulings that invalidate prior laws or regulations, or to increase penalties significantly. Compliance with these laws and regulations can be costly and can delay or impede the development and offering of new products and services.

For example, the General Data Protection Regulation ("GDPR"), which became effective in May 2018, imposes more stringent data protection requirements, and provides for significantly greater penalties for noncompliance, than the EU laws that previously applied. Additionally, California recently enacted legislation, the California Consumer Privacy Act ("CCPA"), which will become effective January 1, 2020. The CCPA will, among other requirements, require covered companies to provide new disclosures to California consumers, and allow such consumers new abilities to opt-out of certain sales of personal information. Legislators have stated that they intend to propose amendments to the CCPA before the effective date. It remains unclear the extent of the modifications that will be made to the CCPA, or how such modifications will be interpreted. The effects of the CCPA potentially are significant and may require us to modify our data processing practices and policies and to incur substantial costs and expenses in an effort to comply. We may also be subject to additional obligations relating to personal data by contract that industry standards apply to our practices. Our actual or perceived failure to comply with applicable laws and regulations or other obligations to which we may be subject relating to personal data, or to protect personal data from unauthorized access, use, or other processing, could result in enforcement actions and regulatory investigations against us, claims for damages by customers and other affected individuals, fines, damage to our reputation, and loss of goodwill, any of which could have a material adverse effect on our operations, financial performance, and business. Further, evolving and changing definitions of personal data and personal information, within the EU, the U.S., U.K., and elsewhere, including the classification of IP addresses, machine identification information, location data, and other information, may limit or inhibit our ability to operate or expand our business, including limiting business relationships and partnerships that may involve the sharing or uses of data, and may require significant costs, resources, and efforts in order to comply.

Our ability to develop, market, and sell products could be harmed if we are unable to retain or hire key personnel.

Our future success depends upon our ability to recruit and retain the services of executive, engineering, sales and marketing, and support personnel. The supply of highly qualified individuals, in particular engineers in very specialized technical areas, or sales people with specialized industry expertise, is limited and competition for such individuals is intense. None of our officers or key employees is bound by an employment agreement for any specific term. The loss of the services of any of our key employees, the inability to attract or retain personnel in the future or delays in hiring required personnel, engineers and sales people, and the complexity and time involved in replacing or training new employees, could delay the development and introduction of new products, and negatively impact our ability to market, sell, or support our products.

A number of our team members are foreign nationals who rely on visas and entry permits in order to legally work in the United States and other countries. In recent years, the United States has increased the level of scrutiny in granting H-1(B), L-1 and other business visas. In addition, the current U.S. administration has made immigration reform a priority. Compliance with United States immigration and labor laws could require us to incur additional unexpected labor costs and expenses or could restrain our ability to retain skilled professionals. Any of these restrictions could have a material adverse effect on our business, results of operations and financial conditions.

Our financial condition and results of operations could suffer if there is an impairment of goodwill or other intangible assets with indefinite lives.

We are required to test intangible assets with indefinite lives, including goodwill, annually or more frequently if certain circumstances change that would more likely than not reduce the fair value of a reporting unit and intangible assets below their carrying values. As of December 31, 2018, our goodwill was $3,108.8 million and our intangible assets with indefinite lives was $49.0 million. When the carrying value of a reporting unit’s goodwill exceeds its implied fair value of goodwill, or if the carrying amount of an intangible asset with an indefinite life exceeds its fair value, a charge to operations is recorded. Either event would result in incremental expenses for that quarter, which would reduce any earnings or increase any loss for the period in which the impairment was determined to have occurred. We have in the past recorded goodwill impairment charges. Declines in our level of revenues or declines in our operating margins, or sustained declines in our stock price, increase the risk that goodwill and intangible assets with indefinite lives may become impaired in future periods.

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Our goodwill impairment analysis is sensitive to changes in key assumptions used in our analysis, such as expected future cash flows, the degree of volatility in equity and debt markets, and our stock price. If the assumptions used in our analysis are not realized, it is possible that an impairment charge may need to be recorded in the future. We cannot accurately predict the amount and timing of any impairment of goodwill or other intangible assets. However, any such impairment would have an adverse effect on our results of operations.

Changes in effective tax rates or adverse outcomes resulting from examination of our income or other tax returns could adversely affect our results.

Our future effective tax rates could be subject to volatility or adversely affected by the following: earnings being lower than anticipated in countries where we have lower statutory rates and higher than anticipated earnings in countries where we have higher statutory rates; changes in the valuation of our deferred tax assets and liabilities; expiration of, or lapses in, the R&D tax credit laws applicable to us; transfer pricing adjustments related to certain acquisitions, including the license of acquired intangibles under our intercompany R&D cost sharing arrangement; costs related to intercompany restructuring; tax effects of share-based compensation; challenges to our methodologies for valuing developed technology or intercompany arrangements; limitations on the deductibility of net interest expense; or changes in tax laws, regulations, accounting principles, or interpretations thereof. For example, on July 24, 2018, the Ninth Circuit Court of Appeals, or the Court, issued an opinion in Altera Corp. v. Commissioner requiring related parties in an intercompany cost-sharing arrangement to share expenses related to share-based compensation. On August 7, 2018, the Court withdrew its opinion to allow time for a reconstituted panel to confer. We are monitoring this case and any impact the final opinion may have on our financial statements. In addition, the Tax Cuts and Jobs Act of 2017 (the “Tax Act”), which was signed into law on December 22, 2017, made significant changes to the taxation of U.S. business entities that may have a meaningful impact to our provision for income taxes. These changes included a reduction to the federal corporate income tax rate, the current taxation of certain foreign earnings, the imposition of base-erosion prevention measures which may limit the deduction of certain transfer pricing payments, and possible limitations on the deductibility of net interest expense or corporate debt obligations. Accounting for the income tax effects of the Tax Act required significant judgments and estimates that are based on current interpretations of the Tax Act. The U.S. Department of the Treasury continues to issue Proposed Regulations that affect various components of the Act. Our future effective tax rate may be impacted by changes in interpretation of the regulations, as well as additional legislation and guidance regarding the Act.

Furthermore, on October 5, 2015, the Organisation for Economic Co-operation and Development, or OECD, an international association of 35 countries including the U.S., published final proposals under its Base Erosion and Profit Shifting, or BEPS, Action Plan. The BEPS Action Plan includes fifteen Actions to address BEPS in a comprehensive manner and represents a significant change to the international corporate tax landscape. These proposals, as adopted by countries, may increase tax uncertainty and adversely affect our provision for income taxes. In addition, we are subject to the continuous examination of our income tax returns by the Internal Revenue Service, or IRS, and other tax authorities. It is possible that tax authorities may disagree with certain positions we have taken and any adverse outcome of such a review or audit could have a negative effect on our financial position and operating results. We regularly assess the likelihood of adverse outcomes resulting from these examinations to determine the adequacy of our provision for income taxes, but the determination of our worldwide provision for income taxes and other tax liabilities requires significant judgment by management, and there are transactions where the ultimate tax determination is uncertain. Although we believe that our estimates are reasonable, the ultimate tax outcome may differ from the amounts recorded in our consolidated financial statements and may materially affect our financial results in the period or periods for which such determination is made. There can be no assurance that the outcomes from continuous examinations will not have an adverse effect on our business, financial condition, and results of operations.

We may face difficulties enforcing our proprietary rights, which could adversely affect our ability to compete.

We generally rely on a combination of patents, copyrights, trademarks, and trade secret laws and contractual restrictions on disclosure of confidential and proprietary information, to establish and maintain proprietary rights in our technology and products. Although we have been issued numerous patents and other patent applications are currently pending, there can be no assurance that any of our patent applications will result in issued patents or that any of our patents or other proprietary rights will not be challenged, invalidated, infringed or circumvented or that our rights will, in fact, provide competitive advantages to us or protect our technology, any of which could result in costly product redesign efforts, discontinuance of certain product offerings and other competitive harm.

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In addition, despite our efforts to protect our proprietary rights, unauthorized parties may attempt to copy aspects of our products or obtain and use information that we regard as proprietary. We generally enter into confidentiality or license agreements with our employees, consultants, vendors, and customers, and generally limit access to and distribution of our proprietary information. However, we cannot assure you that we have entered into such agreements with all parties who may have or have had access to our confidential information or that the agreements we have entered into will not be breached. We cannot guarantee that any of the measures we have taken will prevent misappropriation of our technology.

Furthermore, the laws of some foreign countries may not protect our proprietary rights to the same extent as do the laws of the United States. The outcome of any actions taken in these foreign countries may be different than if such actions were determined under the laws of the United States. Although we are not dependent on any individual patents or group of patents for particular segments of the business for which we compete, if we are unable to protect our proprietary rights in a market, we may find ourselves at a competitive disadvantage to others who need not incur the substantial expense, time, and effort required to create innovative products that have enabled our success.

We are subject to risks arising from our international operations, which may adversely affect our business, financial condition, and results of operations.

We derive a substantial portion of our revenues from our international operations, and we plan to continue expanding our business in international markets. We conduct significant sales and customer support operations directly and indirectly through our distributors and value-added resellers in countries throughout the world and depend on the operations of our contract manufacturers and suppliers that are located outside of the United States. In addition, a portion of our R&D and our general and administrative operations are conducted outside the United States. In some countries, we may experience reduced intellectual property protection.

As a result of our international operations, we are affected by economic, business regulatory, social, and political conditions in foreign countries, including the following:

- changes in general IT spending,
- the imposition of government controls, inclusive of critical infrastructure protection;
- changes or limitations in trade protection laws or other regulatory requirements, which may affect our ability to import or export our products from various countries;
- laws that restrict sales of products developed or manufactured outside of the country;
- varying and potentially conflicting laws and regulations;
- fluctuations in local economies;
- wage inflation or a tightening of the labor market;
- tax policies that could have a business impact;
- import tariffs imposed by the United States and reciprocal tariffs imposed by foreign countries;
- data privacy rules and other regulations that affect cross border data flow; and

- the impact of the following on customer spending patterns: political considerations, unfavorable changes in tax treaties or laws, natural disasters, epidemic disease, labor unrest, earnings expatriation restrictions, misappropriation of intellectual property, military actions, acts of terrorism, political and social unrest and difficulties in staffing and managing international operations.

Any or all of these factors could have a material adverse impact on our business, financial condition, and results of operations.

In addition, the U.K.’s exit from the EU, commonly referred to as Brexit, has caused, and may continue to cause, uncertainty in the global markets. Brexit, if implemented, will take some period of time to complete and could result in regulatory changes that impact our business. For example, changes to the way service providers conduct business and transmit data between the U.K. and the EU could require us to make changes to the way we handle customer data. We will also review the impact of any resulting

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changes to EU or U.K. law that could affect our operations, such as labor policies, financial planning, product manufacturing, and product distribution. Political and regulatory responses to the vote are still developing and we are in the process of assessing the impact the vote may have on our business as more information becomes available. Nevertheless, because we conduct business in the EU, including the U.K., any of the effects of Brexit, including those we cannot anticipate, could have a material adverse effect on our business, operating results, financial condition and cash flows.

There remains significant risk that the U.K. will exit from the EU on March 30, 2019, without agreement between the EU and U.K. on terms addressing customs and trade matters. If it occurs, this "Hard Brexit" scenario would mean, among other things, that as of March 30, 2019, U.K. Customs would have to clear a far greater daily volume of imports than it has ever had to before. If U.K. Customs is not able to handle such increased volume as of the end of March, significant delays in imports may very well result, thereby potentially producing a short-term material adverse effect on our business. Hard Brexit could result in further short-term uncertainty and currency volatility. Additional currency volatility could drive a weaker British pound, which increases the cost of goods imported into our U.K. operations and may decrease the profitability of our U.K. operations. A weaker British pound versus the U.S. dollar also causes local currency results of our U.K. operations to be translated into fewer U.S. dollars during a reporting period. Any adjustments we make to our business and operations as a result of Brexit could result in significant time and expense to complete. Our business is also impacted by the negotiation and implementation of free trade agreements between the United States and other nations. Such agreements can reduce barriers to international trade and thus the cost of conducting business overseas. For instance, the United States recently reached a new trilateral trade agreement with the Governments of Canada and Mexico to replace the North American Free Trade Agreement (NAFTA). If the United States withdraws from NAFTA and the three countries fail to approve the new agreement, known as the United States-Mexico-Canada Agreement (U.S.MCA), our cost of doing business within the three countries could increase.

Moreover, local laws and customs in many countries differ significantly from or conflict with those in the United States or in other countries in which we operate. In many foreign countries, it is common for others to engage in business practices that are prohibited by our internal policies and procedures or U.S. regulations applicable to us. There can be no assurance that our employees, contractors, channel partners, and agents will not take actions in violation of our policies and procedures, which are designed to ensure compliance with U.S. and foreign laws and policies. Violations of laws or key control policies by our employees, contractors, channel partners, or agents could result in termination of our relationship, financial reporting problems, fines, and/or penalties for us, or prohibition on the importation or exportation of our products, and could have a material adverse effect on our business, financial condition and results of operations.

Our products are highly technical and if they contain undetected defects, errors or malware or do not meet customer quality expectations, our business could be adversely affected, and we may be subject to additional costs or lawsuits or be required to pay damages in connection with any alleged or actual failure of our products and services.

Our products are highly technical and complex, are critical to the operation of many networks, and, in the case of our security products, provide and monitor network security and may protect valuable information. Our products have contained and may contain one or more undetected errors, defects, malware, or security vulnerabilities. These errors may arise from hardware or software we produce or procure from third parties. Some errors in our products may only be discovered after a product has been installed and used by end-customers.

Any errors, defects, malware or security vulnerabilities discovered in our products after commercial release could result in monetary penalties, negative publicity, loss of revenues or delay in revenue recognition, loss of customers, loss of future business and reputation, penalties, and increased service and warranty cost, any of which could adversely affect our business, financial condition, and results of operations. In addition, in the event an error, defect, malware, or vulnerability is attributable to a component supplied by a third-party vendor, we may not be able to recover from the vendor all of the costs of remediation that we may incur. In addition, we could face claims for product liability, tort, or breach of warranty or indemnification. Defending a lawsuit, regardless of its merit, is costly and may divert management's attention. If our business liability insurance coverage is inadequate, or future coverage is unavailable on acceptable terms or at all, our financial condition and results of operations could be harmed. Moreover, if our products fail to satisfy our customers' quality expectations for whatever reason, the perception of and the demand for our products could be adversely affected.

We are exposed to fluctuations in currency exchange rates, which could negatively affect our financial condition and results of operations.

Because a substantial portion of our business is conducted outside the United States, we face exposure to adverse movements in non-U.S. currency exchange rates. These exposures may change over time as business practices evolve and could have a material adverse impact on our financial condition and results of operations.

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The majority of our revenues and expenses are transacted in U.S. Dollars. We also have some transactions that are denominated in foreign currencies, primarily the British Pound, Chinese Yuan, Euro, and Indian Rupee related to our sales and service operations outside of the United States. An increase in the value of the U.S. Dollar could increase the real cost to our customers of our products in those markets outside the United States in which we sell in U.S. Dollars. This could negatively affect our ability to meet our customers' pricing expectations in those markets and may result in erosion of gross margin and market share. A weakened U.S. Dollar could increase the cost of local operating expenses and procurement of raw materials to the extent we must purchase components in foreign currencies.

Currently, we hedge currency exposures associated with certain assets and liabilities denominated in nonfunctional currencies and periodically hedge anticipated foreign currency cash flows, with the aim of offsetting the impact of currency fluctuations on these exposures. However, hedge activities can be costly, and hedging cannot fully offset all risks, including long-term declines or appreciation in the value of the U.S. Dollar. If our attempts to hedge against these risks are not successful, or if long-term declines or appreciation in the value of the U.S. Dollar persist, our financial condition and results of operations could be adversely impacted.

If we fail to adequately evolve our financial and managerial control and reporting systems and processes, our ability to manage and grow our business will be negatively affected.

Our ability to successfully offer our products and implement our business plan in a rapidly evolving market requires an effective planning, forecasting, and management process to enable us to effectively scale and adjust our business and business models in response to fluctuating market opportunities and conditions. We will need to continue to improve our financial and managerial control and our reporting systems and procedures in order to manage our business effectively in the future. If we fail to effectively improve our systems and processes or we fail to monitor and ensure that these systems and processes are being used correctly, our ability to manage our business, financial condition, and results of operations may be negatively affected.

If our products do not interoperate with our customers' networks, installations will be delayed or cancelled and could harm our business.

Our products are designed to interface with our customers' existing networks, each of which have different specifications and utilize multiple protocol standards and products from other vendors. Many of our customers' networks contain multiple generations of products that have been added over time as these networks have grown and evolved. Our products must interoperate with many or all of the products within these networks as well as future products in order to meet our customers' requirements. If we find errors in the existing software or defects in the hardware used in our customers' networks, we may need to modify our software or hardware to fix or overcome these errors so that our products will interoperate and scale with the existing software and hardware, which could be costly and could negatively affect our business, financial condition, and results of operations. In addition, if our products do not interoperate with those of our customers' networks, demand for our products could be adversely affected or orders for our products could be cancelled. This could hurt our operating results, damage our reputation, and seriously harm our business and prospects.

Our products incorporate and rely upon licensed third-party technology, and if licenses of third-party technology do not continue to be available to us or are not available on terms acceptable to us, our revenues and ability to develop and introduce new products could be adversely affected.

We integrate licensed third-party technology into certain of our products. From time to time, we may be required to renegotiate our current third-party licenses or license additional technology from third-parties to develop new products or product enhancements or to facilitate new business models. Third-party licenses may not be available or continue to be available to us on commercially reasonable terms. The failure to comply with the terms of any license, including free open source software, may result in our inability to continue to use such license. Some of our agreements with our licensors may be terminated for convenience by them. In addition, we cannot be certain that our licensors are not infringing the intellectual property rights of third parties or that our licensors have sufficient rights to the licensed intellectual property in all jurisdictions in which we may sell our products. Third- party technology we incorporate into our products that is deemed to infringe on the intellectual property of others may result, and in some cases has resulted, in limitations on our ability to source technology from those third parties, restrictions on our ability to sell products that incorporate the infringing technology, increased exposure to liability that we will be held responsible for incorporating the infringing technology in our products and increased costs involved in removing that technology from our products or developing substitute technology. Our inability to maintain or re-license any third-party licenses required in our products or our inability to obtain third-party licenses necessary to develop new products and product enhancements, could require us, if possible, to develop substitute technology or obtain substitute technology of lower quality or performance standards or at a greater cost, any of which could delay or prevent product shipment and harm our business, financial condition, and results of operations.

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We rely on the availability and performance of information technology services provided by third parties, including IBM which will manage a significant portion of our systems.

Under the terms of our recent Master Services Agreement and certain Statements of Work, following a transition period, IBM will provide us with a broad range of information technology services, such as applications, including support, development and maintenance; infrastructure management and support, including for servers storage and network devices; and end user support including service desk. We expect that our businesses will become dependent on the services provided and systems operated for us by IBM and its third-party providers. While we believe that we conducted appropriate due diligence before entering into this agreement, the failure of one or more of these entities to meet our performance standards and expectations, including with respect to data security, may have a material adverse effect on our business, results of operations or financial condition.

Our success is dependent on our ability to maintain effective relationships with IBM and other third-party technology and service providers as well as the ability of IBM and any other third-party providers to perform as expected. We may terminate our agreement with IBM and any and all Statements of Work at any time on short notice for cause, convenience, certain specific performance failures, a breach of warranties by IBM, failure to transition, failure to transform, changes in law, force majeure, or a change in the control of either IBM or us. Depending on the type and timing of a termination, we may be required to pay certain termination amounts to IBM. IBM's only right to terminate the agreement is based on our failure to comply with certain terms applying to disputed payments.

Our ability to realize the expected benefits of this arrangement is subject to various risks, some of which are not within our complete control. These risks include, but are not limited to, disruption in services and the failure to protect the security and integrity of the Company's data under the terms of the agreement. We are unable to provide assurances that some or all of these risks will not occur. Failure to effectively mitigate these risks, if they occur, could have a material adverse effect on our operations and financial results. In addition, we could face significant additional costs or business disruption if our arrangement with IBM is terminated or impaired and we cannot find alternative IT services or support on commercially reasonable terms or on a timely basis or if we are unable to hire new employees in order to return these services in-house.

We are required to evaluate the effectiveness of our internal control over financial reporting and publicly disclose material weaknesses in our controls. Any adverse results from such evaluation may adversely affect investor perception, and our stock price.

Section 404 of the Sarbanes-Oxley Act of 2002 requires our management to assess the effectiveness of our internal control over financial reporting and to disclose in our filing if such controls were unable to provide assurance that a material error would be prevented or detected in a timely manner. We have an ongoing program to review the design of our internal controls framework in keeping with changes in business needs, implement necessary changes to our controls design and test the system and process controls necessary to comply with these requirements. If in the future, our internal controls over financial reporting are determined to be not effective resulting in a material weakness or significant deficiency, investor perceptions regarding the reliability of our financial statements may be adversely affected which could cause a decline in the market price of our stock and otherwise negatively affect our liquidity and financial condition.

Failure to maintain our credit ratings could adversely affect our cost of funds and related margins, liquidity, competitive position and access to capital markets.

The major credit rating agencies routinely evaluate our indebtedness. This evaluation is based on a number of factors, which include financial strength as well as transparency with rating agencies and timeliness of financial reporting. There can be no assurance that we will be able to maintain our credit ratings and failure to do so could adversely affect our cost of funds and related margins, liquidity, competitive position and access to capital markets.

We may be unable to generate the cash flow to satisfy our expenses, make anticipated capital expenditures or service our debt obligations, including the Notes and the Revolving Credit Facility.

As of December 31, 2018, we have issued $2,150.0 million in aggregate principal amount of senior notes, which we refer to collectively as the Notes, and had $2,139.0 million in total outstanding debt, including $350 million of senior notes that mature in February 2019. In June 2014, we entered into a Credit Agreement with certain institutional lenders that provides for a five-year $500.0 million unsecured revolving credit facility, which we refer to as the Revolving Credit Facility, with an option to increase the Revolving Credit Facility by up to an additional $200.0 million. The Credit Agreement will terminate in June 2019, at which point all amounts borrowed must be repaid. As of December 31, 2018, no amounts were outstanding under the Credit Agreement.

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We may not be able to generate sufficient cash flow to enable us to satisfy our expenses, make anticipated capital expenditures or service our indebtedness, including the Notes and the Revolving Credit Facility (if drawn upon). Our ability to pay our expenses, satisfy our debt obligations, refinance our debt obligations and fund planned capital expenditures will depend on our future performance, which will be affected by general economic, financial, competitive, legislative, regulatory and other factors beyond our control. Based upon current levels of operations, we believe cash flow from operations and available cash will be adequate for at least the next twelve months to meet our anticipated requirements for working capital, capital expenditures and scheduled payments of principal and interest on our indebtedness, including the Notes and the Revolving Credit Facility (if drawn upon). However, if we are unable to generate sufficient cash flow from operations or to borrow sufficient funds in the future to service our debt, we may be required to sell assets, reduce capital expenditures, refinance all or a portion of our existing debt (including the Notes) or obtain additional financing. There is no assurance that we will be able to refinance our debt, sell assets or borrow more money on terms acceptable to us, or at all.

The indentures that govern the Notes contain various covenants that limit our ability and the ability of our subsidiaries to, among other things:

- incur liens;
- incur sale and leaseback transactions; and
- consolidate or merge with or into, or sell substantially all of our assets to, another person.

The Credit Agreement contains two financial covenants along with customary affirmative and negative covenants that include the following:

- maintenance of a leverage ratio no greater than 3.0x and an interest coverage ratio no less than 3.0x
- covenants that limit or restrict the ability of the Company and its subsidiaries to, among other things, grant liens, merge or consolidate, dispose of all or substantially all of its assets, change their accounting or reporting policies, change their business and incur subsidiary indebtedness, in each case subject to customary exceptions for a credit facility of this size and type.

As a result of these covenants, we are limited in the manner in which we can conduct our business, and we may be unable to engage in favorable business activities or finance future operations or capital needs. Accordingly, these restrictions may limit our ability to successfully operate our business. A failure to comply with these restrictions could lead to an event of default, which could result in an acceleration of the indebtedness. Our future operating results may not be sufficient to enable compliance with these covenants to remedy any such default. In addition, in the event of an acceleration, we may not have or be able to obtain sufficient funds to make any accelerated payments, including those under the Notes, and the Revolving Credit Facility (if drawn upon).

In addition, certain changes under the Tax Act may result in limitations on the deductibility of our net business interest expenses. The Tax Act generally limits the annual deduction for net business interest expense to an amount equal to 30% of adjusted taxable income. As a result, if our taxable income were to decline, we may not be able to fully deduct our net interest expense. These changes, among others under the Tax Act, could result in increases to our future U.S. tax expenses, which could have a material impact on our business.

A portion of the transaction consideration we received from the divestiture of our Junos Pulse product portfolio is in the form of a non-contingent seller promissory note and we may not receive the amount owed to us (including accrued interest), including in the time frame contemplated, by the buyer under the note.

In the fourth quarter of fiscal 2014, we completed the sale of our Junos Pulse product portfolio to an affiliate of Siris Capital, a private equity firm, for total consideration of $230.7 million, of which $125.0 million was in the form of an 18-month non-contingent interest-bearing promissory note issued to the Company. On May 1, 2017, we received a principal payment in the amount of $75.0 million and outstanding interest on the note, and we and the issuer agreed to further amend the terms of the note with respect to the remaining approximately $58.0 million to, among other things, extend the maturity date from December 31, 2018 to September 30, 2022, provide that interest due can be paid in kind by increasing the outstanding principal amount of the note and subordinate the note to other debt issued by senior lenders. Since a portion of the transaction consideration is in the form of a non-contingent seller promissory note and the note is subordinated to debt issued by senior lenders, there is the risk that we may not receive the amount owed to us (including accrued interest), including in the time frame contemplated, under the note. In the event that the promissory note is not repaid on the terms we contemplate, any collection or restructuring efforts we undertake may be costly and require significant time and attention from our management and there is no guarantee that we will be able to recover the amounts owed to us in full.

Our failure to pay quarterly dividends to our stockholders or the failure to meet our commitments to return capital to our stockholders could have a material adverse effect on our stock price.

Our ability to pay quarterly dividends or achieve our intended capital return policy will be subject to, among other things, our financial position and results of operations, available cash and cash flow, capital and debt service requirements, use of cash for acquisitions and other factors. Any failure to pay or increase future dividends as announced, or a reduction or discontinuation of quarterly dividends could have a material adverse effect on our stock price.

In November 2018, we announced that for 2019, we intend to target a capital return policy, inclusive of share repurchases and dividends, of approximately 75% of annual free cash flow. Free cash flow is calculated as net cash provided by operating activities less capital expenditures. In January 2018, we announced that our Board of Directors approved a new $2.0 billion buyback authorization, which replaced our prior authorization. In February 2018, as a part of our new buyback authorization, we entered into a $750.0 million accelerated share repurchase program, or ASR, which was completed in the third quarter of 2018, and our Board of Directors declared an increase to our quarterly cash dividend to $0.18 per share, which reflects an increase of 80% compared to previous quarterly dividends. In January 2019, our Board of Directors declared an increase to our quarterly cash dividend to $0.19 per share. Any failure to meet our commitments to return capital to our stockholders could have a material adverse effect on our stock price.

The investment of our cash balance and our investments in government and corporate debt securities and equity securities are subject to risks, which may cause losses and affect the liquidity of these investments.

At December 31, 2018, we had $2,489.0 million in cash and cash equivalents and $1,269.1 million in short-and long-term investments. We have invested these amounts primarily in asset-backed securities, certificates of deposit, commercial paper, corporate debt securities, foreign government debt securities, money market funds, mutual funds, time deposits, U.S. government agency securities, and U.S. government securities. We also have $90.4 million in other long-term assets for our investments in privately-held companies. Certain of our investments are subject to general credit, liquidity, market, sovereign debt, and interest rate risks. Our future investment income may fall short of expectations due to changes in interest rates or if the decline in fair value of our publicly traded debt or equity investments is judged to be other-than-temporary. These market risks associated with our investment portfolio may have a material adverse effect on our liquidity, financial condition, and results of operations.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware will be the sole and exclusive forum for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers, or employees.

Our amended and restated bylaws provide that, unless we consent to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or if the Court of Chancery does not have jurisdiction, the U.S. District Court for the District of Delaware) is the sole and exclusive forum for (i) any derivative action or proceeding brought on our behalf; (ii) any action asserting a claim of breach of fiduciary duty owed by any of our current or former directors, officers, or other employees to us or to our stockholders; (iii) any action asserting a claim arising pursuant to the Delaware General Corporation Law, our restated certificate of incorporation, or our bylaws; (iv) any action or proceeding asserting a claim as to which Delaware General Corporation Law confers jurisdiction on the Court of Chancery or (v) any action asserting a claim governed by the internal affairs doctrine. The exclusive forum provisions in our bylaws may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our current or former directors, officers, or other employees, which may discourage such lawsuits against us and our current or former directors, officers, and other employees. Alternatively, if a court were to find the exclusive forum provisions contained in our bylaws to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could have a material and adverse impact on our business.

Uninsured losses could harm our operating results.

We self-insure against many business risks and expenses, such as intellectual property litigation, cybersecurity and our medical benefit programs, where we believe we can adequately self-insure against the anticipated exposure and risk or where insurance is either not deemed cost-effective or is not available. We also maintain a program of insurance coverage for various types of property, casualty, and other risks. We place our insurance coverage with various carriers in numerous jurisdictions. The types and amounts of insurance that we obtain vary from time to time and from location to location, depending on availability, cost, and our decisions with respect to risk retention. The policies are subject to deductibles, policy limits, and exclusions that result in our retention of a level of risk on a self-insurance basis. In addition, our insurance coverage may not be adequate to compensate us

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for all losses or failures that may occur. Losses not covered by insurance could be substantial and unpredictable and could adversely affect our financial condition and results of operations.

Our stock price may fluctuate.

Historically, our common stock has experienced substantial price volatility, particularly as a result of variations between our actual financial results and the published expectations of analysts and as a result of announcements by our competitors and us. Furthermore, speculation in the press or investment community about our strategic position, financial condition, results of operations, business, security of our products, or significant transactions can cause changes in our stock price. In addition, the stock market has experienced extreme price and volume fluctuations that have affected the market price of many technology companies in particular and that have often been unrelated to the operating performance of these companies. From time to time, economic weakness has contributed to extreme price and volume fluctuations in global stock markets that have also reduced the market price of many technology company stocks, including ours. These factors, as well as general economic and political conditions and the announcement of proposed and completed acquisitions or other significant transactions, or any difficulties associated with such transactions, by us or our current or potential competitors, may materially adversely affect the market price of our common stock in the future.

ITEM 1B. Unresolved Staff Comments

Not applicable.

ITEM 2. Properties

Our corporate headquarters are located on 80 acres of owned land in Sunnyvale, California and includes approximately 0.7 million square feet of owned buildings. In addition to our owned facilities, we lease approximately 0.1 million square feet in buildings in Sunnyvale, California as part of our corporate headquarters as of December 31, 2018.

In addition to our leased buildings in Sunnyvale, we also lease space (including offices and other facilities) in various locations throughout the United States, Canada, South America, EMEA, and APAC regions, including offices in Australia, China, Hong Kong, India, Ireland, Israel, Japan, the Netherlands, Russia, United Arab Emirates, and the United Kingdom. As of December 31, 2018, we leased approximately 1.6 million square feet worldwide, with approximately 31% in North America. The respective operating leases expire at various times through November 2029. In addition, in July 2015 we entered into a lease arrangement through March 2026 for approximately 63,000 square feet of space in the State of Washington. Each leased facility is subject to an individual lease or sublease, which could provide various options to renew/terminate the agreement or to expand/contract the leased space. We believe that our current offices and other facilities are in good condition and appropriately support our current business needs. We may improve, replace or reduce facilities as considered appropriate to meet the needs of our operations.

For additional information regarding obligations under our leases, see Note 16, Commitments and Contingencies, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report. For additional information regarding properties by geographic region, see Note 13, Segments, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report.

ITEM 3. Legal Proceedings

The information set forth under the heading “Legal Proceedings” in Note 16, Commitments and Contingencies, in Notes to Consolidated Financial Statements in Item 8 of Part II of this Report, is incorporated herein by reference.

ITEM 4. Mine Safety Disclosures

Not applicable.

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PART II

ITEM 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market Information

The principal market in which our common stock is traded is the New York Stock Exchange, or NYSE, under the symbol JNPR.

Stockholders

As of February 15, 2019, there were 742 stockholders of record of our common stock and we believe a substantially greater number of beneficial owners who hold shares through brokers, banks or other nominees.

Dividends

We paid cash dividends of $0.18 per share each quarter, totaling $249.3 million during the year ended December 31, 2018. In January 2019, we declared a quarterly cash dividend of $0.19 per share of common stock to be paid on March 22, 2019 to stockholders of record as of the close of business on March 1, 2019. The declaration and amount of any future cash dividends are at the discretion of the Board of Directors and will depend on our financial performance, economic outlook, and any other relevant considerations.

Unregistered Securities Issued

On December 6, 2018, we issued 105,317 shares of our common stock as consideration to an individual in connection with the 2016 AppFormix acquisition.

On December 7, 2018, we issued 56,692 shares of our common stock as consideration to one individual in connection with the HTBase acquisition in the fourth quarter of 2018.

The issuance of the above securities was exempt from registration under the Securities Act of 1933, as amended (the “Securities Act”), in reliance upon Section 4(a)(2) of the Securities Act as transactions by an issuer not involving any public offering and/or the private offering safe harbor provision of Rule 506 of Regulation D promulgated under the Securities Act.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

During the three months ended December 31, 2018, there were no share repurchases under our Board approved 2018 Stock Repurchase Program, which authorized us to purchase an aggregate of up to $2.0 billion of our common stock. Future share repurchases will be subject to a review of the circumstances in place at that time and will be made from time to time in private transactions or open market purchases as permitted by securities laws and other legal requirements, including Rule 10b-18 promulgated under the Exchange Act. This program may be discontinued at any time.

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Company Stock Performance

The information contained in this Company Stock Performance section shall not be deemed to be incorporated by reference into other U.S. Securities and Exchange Commission, or SEC, filings; nor deemed to be soliciting material or filed with the Commission or subject to Regulation 14A or 14C or subject to Section 18 of the Exchange Act. The comparisons in the performance graph below are based upon historical data and are not indicative of, or intended to forecast, future performance of our common stock.

The performance graph below shows the cumulative total stockholder return over a five-year period assuming the investment of $100 on December 31, 2013, in each of Juniper Networks' common stock, the Standard & Poor's 500 Stock Index (“S&P 500”), and the NASDAQ Telecommunications Index. Total stockholder return assumes reinvestment of all dividends.

	As of December 31,					
	2013	2014	2015	2016	2017	2018
JNPR	$100.00	$99.77	$125.22	$130.34	$133.31	$129.24
S&P 500	$100.00	$113.68	$115.24	$129.02	$157.17	$150.27
NASDAQ Telecommunications Index	$100.00	$111.51	$105.60	$124.17	$149.28	$157.14

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ITEM 6. Selected Financial Data

The following selected consolidated financial data is derived from our audited Consolidated Financial Statements. As our operating results are not necessarily indicative of future operating results, this data should be read in conjunction with Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, and the Consolidated Financial Statements and the notes thereto in Item 8, Financial Statements and Supplementary Data, of this Report, which are incorporated herein by reference.

The information presented below reflects the impact of certain significant transactions and the adoption of certain accounting pronouncements, which makes a direct comparison difficult between each of the last five fiscal years. For a complete description of matters affecting the results in the tables below during the three years ended December 31, 2018, see Notes to Consolidated Financial Statements in Item 8 of Part II of this Report.

Consolidated Statements of Operations Data

	Years Ended December 31,				
	2018[(1)]	2017[(2)]	2016	2015	2014[(3)]
	(In millions)				
Net revenues	$4,647.5	$5,027.2	$4,990.1	$4,857.8	$4,627.1
Gross margin	2,741.2	3,072.1	3,104.5	3,078.6	2,858.2
Operating income (loss)	572.2	848.1	889.7	912.0	(419.7)
Net income (loss)	$566.9	$306.2	$592.7	$633.7	$(334.3)

(1) Fiscal year 2018 includes a tax benefit of $133.0 million related to a lapse in the statute of limitations and tax accounting method changes related to deferred revenue.

(2) Fiscal year 2017 includes an estimated $289.5 million of tax expense related to the U.S. Tax Cuts and Jobs Act, and pre-tax restructuring charges of $65.6 million.

(3) Fiscal year 2014 includes the following significant pre-tax items: impairment of goodwill of $850.0 million; restructuring and other charges of $208.5 million; gain on the sale of equity investments of $163.0 million; gain, net of legal fees in connection with the litigation settlement with Palo Alto Networks of $196.1 million; and gain on the sale of Junos Pulse of $19.6 million.

Per Common Share Data

	Years Ended December 31,				
	2018	2017	2016	2015	2014
Net income (loss) per share:					
Basic	$1.62	$0.81	$1.55	$1.62	$(0.73)
Diluted	$1.60	$0.80	$1.53	$1.59	$(0.73)
Cash dividends declared per share of common stock	$0.72	$0.40	$0.40	$0.40	$0.20

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Consolidated Balance Sheet Data

	As of December 31,				
	2018	2017	2016	2015	2014
	(In millions)				
Cash, cash equivalents, and investments	$3,758.1	$4,021.0	$3,657.3	$3,192.2	$3,104.9
Working capital	2,739.3	2,446.3	2,236.0	1,110.5	1,297.2
Goodwill	3,108.8	3,096.2	3,081.7	2,981.3	2,981.5
Total assets[(1)]	9,363.3	9,833.8	9,656.5	8,607.9	8,273.6
Total debt[(1)]	2,139.0	2,136.3	2,133.7	1,937.4	1,341.2
Total long-term liabilities (excluding long-term debt)[(2)]	908.5	1,278.4	824.4	594.1	499.9
Total stockholders' equity[(3) (4)]	$4,823.2	$4,680.9	$4,962.5	$4,574.4	$4,919.1

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(1) Fiscal year 2016 includes the adoption of Accounting Standards Update ("ASU") No. 2015-03 (Subtopic 835-30) - Simplifying the Presentation of Debt Issuance Costs, requiring that debt issuance costs related to a recognized debt liability be presented in the balance sheet as a direct deduction from the carrying amount of that debt liability, consistent with debt discounts. Other long-term assets and long-term debt in the prior years were retrospectively adjusted to conform to the required presentation.

(2) Fiscal 2017 includes an estimated $394.0 million recorded in long-term income taxes payable related to the one-time transition tax as a result of the Tax Cuts and Jobs Act.

(3) Fiscal year 2017 includes the adoption of ASU No. 2016-09 (Topic 718) Compensation—Stock Compensation: Improvements to Employee Share-Based Payment Accounting, which simplified several aspects of the accounting for share-based payment transactions, including the accounting for forfeitures, among other things. We elected to account for forfeitures as they occur using a modified retrospective transition method, rather than estimating forfeitures, resulting in a cumulative-effect adjustment of $9.0 million, which increased the January 1, 2017 opening accumulated deficit balance on the Consolidated Balance Sheets.

(4) Fiscal 2018 includes the adoption of ASU No. 2014-09 (Topic 606) Revenue from Contracts with Customers, which provides guidance for revenue recognition that superseded the revenue recognition requirements in Accounting Standards Codification Topic 605, Revenue Recognition and most industry specific guidance. We adopted the standard under the modified retrospective approach, applying the amendments to prospective reporting periods. Upon adoption, we recorded a cumulative effect adjustment of $324.7 million, which decreased the January 1, 2018 opening accumulated deficit balance on the Consolidated Balance Sheet primarily due to the application of the new guidance in the areas of distributor sales, software revenue, variable consideration, revenue allocation, and contract acquisition costs.

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ITEM 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion should be read with the Consolidated Financial Statements and the related notes in Item 8 of Part II of this Report.

The following discussion is based upon our Consolidated Financial Statements included elsewhere in this Report, which have been prepared in accordance with U.S. generally accepted accounting principles, or U.S. GAAP. In the course of operating our business, we routinely make decisions as to the timing of the payment of invoices, the collection of receivables, the manufacturing and shipment of products, the fulfillment of orders, the purchase of supplies, and the building of inventory and spare parts, among other matters. In making these decisions, we consider various factors including contractual obligations, customer satisfaction, competition, internal and external financial targets and expectations, and financial planning objectives. Each of these decisions has some impact on the financial results for any given period. For further information about our critical accounting policies and estimates, see "Critical Accounting Policies and Estimates" section included in this "Management's Discussion and Analysis of Financial Condition and Results of Operations."

To aid in understanding our operating results for the periods covered by this Report, we have provided an executive overview, which includes a summary of our business and market environment along with a financial results and key performance metrics overview. These sections should be read in conjunction with the more detailed discussion and analysis of our consolidated financial condition and results of operations in this Item 7, our "Risk Factors" section included in Item 1A of Part I, and our Consolidated Financial Statements and notes thereto included in Item 8 of Part II of this Report.

Executive Overview

Business and Market Environment

Juniper designs, develops, and sells products and services for high-performance networks to enable customers to build scalable, reliable, secure and cost-effective networks for their businesses, while achieving agility and improved operating efficiency through automation.

Our products are sold in three geographic regions: Americas; Europe, Middle East and Africa, or EMEA; and Asia Pacific, or APAC. We sell our high-performance network products and service offerings across routing, switching, and security technologies. In addition to our products, we offer our customers services, including maintenance and support, professional services, and education and training programs. Our products and services address high-performance network requirements for our customers within our verticals: Cloud, Service Provider, and Enterprise who view their network as critical to their success. We believe our silicon, systems, and software represent innovations that transform the economics and experience of networking, helping our customers achieve superior performance, greater choice, and flexibility, while reducing overall total cost of ownership.

Further, our intent is to expand our software business by introducing new software solutions to our product portfolio that simplify the operation of networks, and allow our customers across our key verticals flexibility in consumption and deployment. We believe our software revenues as a percentage of total revenues will increase over time as we introduce new software product offerings and business models designed to better monetize the value of our software offerings.

We believe the network needs for our customers in our Cloud, Service Provider, and Enterprise verticals are converging, as these customers recognize the need for high performance networks and are adopting cloud architectures for their infrastructure and service delivery, such as large public and private data centers and service provider edge data centers, for improved agility and greater levels of operating efficiency.

In 2018, we continued to experience weakness within our Cloud and Service provider verticals. In our Cloud vertical, certain large Cloud customers were transitioning their network architecture as they continued to add capacity. This resulted in these customers transitioning from purchasing our MX product family to our PTX product family which contributed to the decline in our net revenues as the PTX product family has a lower average selling price compared to the MX product family. We believe the MX to PTX transition is largely behind us; however, the pace of deployments in a portion of our Cloud customer's networks has been slower than expected. Nevertheless, we are focused on the Cloud vertical as well as the transition to 400-gig Ethernet, or 400G, which we believe will present further opportunities for Juniper across our portfolio as our Cloud customers value high-performance, highly compact, power efficient infrastructures, which we support and continue to develop.

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In our Service Provider vertical, changes in business models and the increase in industry consolidation, such as acquisitions, mergers, and partnerships may continue to impact Service Provider investment and the build-out of their networks in the near-term, however, we believe that our Service Provider customers will need to invest in the build-out of high performance networks and the transformation of existing legacy infrastructure to distributed cloud environments. We are committed to this transformation, which we refer to as the Telco Cloud transformation, as our Service Provider customers rearchitect their infrastructure to enable, among other things, next generation mobile network build-outs, or 5G. We are well positioned to capitalize on 5G carrier deployments with the refresh of our MX 5G product and Contrail solutions as well as our new partnership with Ericsson to accelerate 5G initiatives by leveraging each company’s complementary portfolios to drive our competitive advantage in the marketplace. We believe these products and partnership position Juniper for improved Service Provider spending in late 2019.

We remain confident in our strategy and we are executing against our innovation roadmap, as each of our industry verticals transitions to cloud architectures. We believe our understanding of high-performance networking technology and cloud architecture, and our strategy, position us to capitalize on the industry transition to more automated, cost-efficient, scalable networks.

In 2018, we continued to execute on our product and solutions strategy and announced several new innovations, including a new 400G optimized routing platform; a new high-performance MX Series 5G Universal Routing Platform with new programmable silicon; an upgrade to our high-end SRX firewall offering with our SPC3 Advanced Security Acceleration line card; and our multi-cloud orchestration and telemetry platform including Contrail Edge Cloud and Contrail Enterprise Multicloud, each of which, we believe, will help strengthen our position across our core markets. We also announced new initiatives under an existing partnership with Nutanix, which we expect will help strengthen our ability to capitalize on multicloud with our Contrail Enterprise Multicloud integration with Nutanix’s application programming interface, or APIs to provide enhanced network visibility.

In late 2018, we completed the acquisition of HTBase, a software company that has developed a unique and disruptive platform for software-defined enterprise multicloud, which we expect will accelerate our leadership in multicloud and function with the compute orchestration capabilities of Contrail Enterprise Multicloud. We will continue to look at targeted and strategic acquisitions that we believe can complement our portfolio, operations, R&D strategy, and overall business.

In 2019, we believe we will continue to experience weakness with our Cloud customers in the near-term, as deployment cycles remain difficult to predict; however, we remain confident in our competitive position with our strategic Cloud customers. We are taking a number of actions that we believe will help Juniper achieve year-over-year revenue growth at some point in the second half of 2019 such as: (1) new product offerings which include new MX line cards to capitalize on 5G carrier initiatives; 400G platforms to capture data center footprint; and new enhancements to our Contrail Enterprise Multicloud platform that make it simpler and more cost effective, (2) transitioning our sales organization to better align with our sales strategy, and (3) monetizing our software offerings through subscriptions. Further, we believe the 400G upgrade cycle, 5G deployments, and enterprise multicloud initiatives each represent large opportunities where are well positioned to benefit over the next several years.

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Financial Results and Key Performance Metrics Overview

On January 1, 2018, we adopted Financial Accounting Standards Board, or FASB, Accounting Standards Update, or ASU, No. 2014-09 (Topic 606) - Revenue from Contracts with Customers, which we refer to as Topic 606. The standard provides guidance for revenue recognition that superseded the revenue recognition requirements in Accounting Standards Codification Topic 605, Revenue Recognition, which we refer to as Topic 605, and most industry specific guidance. See Note 2, Significant Accounting Policies, in the Notes to Consolidated Financial Statements in Item 8 of Part II of this Report for further discussion on the adoption of Topic 606. Results for reporting periods beginning after January 1, 2018 are presented under Topic 606, while prior period amounts are not adjusted and continue to be reported in accordance with the historic accounting under Topic 605.

The following table provides an overview of our financial results and key financial metrics (in millions, except per share amounts, percentages, and days sales outstanding, or DSO):

	As of and for the Years Ended December 31,						
	2018	2017	2016	2018 vs. 2017		2017 vs. 2016	
				$ Change	% Change	$ Change	% Change
Net revenues	$4,647.5	$5,027.2	$4,990.1	$(379.7)	(8)%	$37.1	1%
Gross margin	$2,741.2	$3,072.1	$3,104.5	$(330.9)	(11)%	$(32.4)	(1)%
Percentage of net revenues	59.0%	61.1%	62.2%				
Operating income	$572.2	$848.1	$889.7	$(275.9)	(33)%	$(41.6)	(5)%
Percentage of net revenues	12.3%	16.9%	17.8%				
Net income	$566.9	$306.2	$592.7	$260.7	85%	$(286.5)	(48)%
Percentage of net revenues	12.2%	6.1%	11.9%				
Net income per share							
Basic	$1.62	$0.81	$1.55	$0.81	100%	$(0.74)	(48)%
Diluted	$1.60	$0.80	$1.53	$0.80	100%	$(0.73)	(48)%
Operating cash flows	$861.1	$1,259.3	$1,126.6	$(398.2)	(32)%	$132.7	12%
Stock repurchase plan activity	$750.0	$719.7	$312.9	$30.3	4%	$406.8	130%
Cash dividends declared per common stock	$0.72	$0.40	$0.40	$0.32	80%	$—	—%
DSO(*)	58	62	68	(4)	(6)%	(6)	(9)%
Deferred revenue	$1,213.6	$1,539.3	$1,481.1	$(325.7)	(21)%	$58.2	4%
Product deferred revenue	$144.4	$334.2	$322.9	$(189.8)	(57)%	$11.3	3%
Service deferred revenue	$1,069.2	$1,205.1	$1,158.2	$(135.9)	(11)%	$46.9	4%

(*) DSO is for the fourth quarter ended December 31, 2018, 2017 and 2016.

- Net Revenues: During 2018, net revenues decreased compared to 2017, primarily due to lower routing product revenues from our Cloud and Service Provider verticals in the Americas. We experienced ongoing networking architectural transitions and a slower than expected pace of deployments for certain large Cloud customers as well as a decline in our Service Provider business due to the timing of deployments. The year-over-year decline in product net revenues was partially offset by broad-based revenue growth in our Enterprise vertical. Excluding the impact of Topic 606, our service net revenues would have increased during the 2018, compared to 2017, primarily due to strong renewal and attach rates of support contracts. Of our top ten customers for 2018, five were Cloud, four were Service Provider, and one was an Enterprise.

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During 2018, the adoption of Topic 606 resulted in a decrease in revenue recognition of $22.6 million due to lower service revenues, partially offset by higher product revenues. Service revenues during 2018 were lower by $122.9 million under Topic 606, compared to Topic 605, primarily due to the impact of revenue allocation between products and services. Product revenues during 2018 were higher by $100.3 million under Topic 606, compared to Topic 605, primarily due to the impact of revenue allocation between products and services and the timing of revenue recognition of certain contracts that were precluded by Topic 605, partially offset by variable consideration. The product revenues increase from Topic 606 was primarily allocated between routing and switching.

- Gross Margin: Our gross margin as a percentage of net revenues decreased during 2018, compared to 2017, primarily due to lower net revenues and product mix, resulting from the year-over-year decline in routing revenues from our Cloud and Service Provider verticals, and to a lesser extent, the impact of Topic 606, partially offset by improvements in our cost structure.

- Operating Margin: During 2018, compared to 2017, operating income as a percentage of net revenues decreased primarily due to the drivers described in the gross margin discussion above, partially offset by a net decrease in our operating expenses during 2018, compared to 2017, as a result of lower restructuring charges.

- Net Income: During 2018, net income increased compared to 2017, primarily driven by a lower statutory tax rate due to the Tax Act and tax benefits related to items unique to 2018. See Note 14, Income Taxes, in the Notes to Consolidated Financial Statements in Item 8 of Part II of this Report, for further discussion.

- Operating Cash Flows: Net cash provided by operations decreased in 2018, compared to 2017, primarily due to higher cash collections from customers during 2017 related to service renewals invoiced during the fourth quarter of 2016, partially offset by a decline in cash paid for personnel-related costs, principally as a result of a reduction in headcount and lower incentive compensation, and a decrease in payments to suppliers.

- Capital Return: In 2018, we repurchased 29.3 million shares of our common stock for an aggregate amount of $750.0 million through the completion of a $750.0 million accelerated share repurchase program, or ASR. During 2018, we also paid a quarterly cash dividend of $0.18 per share, for an aggregate amount of $249.3 million.

- DSO: DSO is calculated as the ratio of ending accounts receivable, net of allowances, divided by net revenues for the preceding 90 days. DSO for the quarter ended December 31, 2018 decreased, compared to the quarter ended December 31, 2017, primarily due to lower overall invoicing volume, partially offset by lower revenues.

- Deferred Revenue: Total deferred revenue decreased as of December 31, 2018, compared to December 31, 2017, due to the impact of adoption of Topic 606. See Note 2, Significant Accounting Policies, in the Notes to Consolidated Financial Statements in Item 8 of Part II of this Report, for further discussion.

Critical Accounting Policies and Estimates

The preparation of the financial statements and related disclosures in conformity with U.S. GAAP requires us to make judgments, assumptions, and estimates that affect the amounts reported in the Consolidated Financial Statements and the accompanying notes. On an ongoing basis, we evaluate our estimates, including those related to sales returns, pricing credits, warranty costs, allowance for doubtful accounts, impairment of long-term assets, especially goodwill and intangible assets, contract manufacturer liabilities, assumptions used in the valuation of share-based compensation, and litigation. We base our estimates and assumptions on current facts, historical experience, and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. For further information about our significant accounting policies, see Note 2, Significant Accounting Policies, in

Notes to Consolidated Financial Statements in Item 8 of Part II of this Report, which describes the significant accounting policies and methods used in the preparation of the Consolidated Financial Statements. The accounting policies described below are significantly affected by critical accounting estimates. Such accounting policies require significant judgments, assumptions, and estimates used in the preparation of the Consolidated Financial Statements and actual results could differ materially from the amounts reported based on these policies. To the extent there are material differences between our estimates and the actual results, our future consolidated results of operations may be affected.

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- Goodwill: We make significant estimates, assumptions, and judgments when valuing goodwill and other intangible assets in connection with the initial purchase price allocation of an acquired entity, as well as when evaluating impairment of goodwill and other intangible assets on an ongoing basis. These estimates are based upon a number of factors, including historical experience, market conditions, and information obtained from the management of the acquired company. Critical estimates in valuing certain intangible assets include, but are not limited to, historical and projected customer retention rates, anticipated growth in revenue from the acquired customer and product base, and the expected use of the acquired assets. These factors are also considered in determining the useful life of the acquired intangible assets. The amounts and useful lives assigned to identified intangible assets impacts the amount and timing of future amortization expense.

Goodwill represents the future economic benefits arising from other assets acquired in a business combination that are not individually identified and separately recorded. The excess of the purchase price over the estimated fair value of net assets of businesses acquired in a business combination is recognized as goodwill. We evaluate our goodwill for impairment on an annual basis, as of November 1st, or more frequently if an event occurs or facts and circumstances change that would more likely than not reduce the fair value of our reporting units below their carrying amount.

Goodwill is tested for impairment at the reporting unit level, which is one level below our operating segment level, by comparing the reporting unit's carrying value, including goodwill, to the fair value of the reporting unit. The reporting units are determined based on the components of our operating segment that constitutes a business for which discrete financial information is available, and segment management regularly review the operating results of the component.

The provisions of the accounting standard for goodwill and other intangibles allow us to first assess qualitative factors to determine whether it is necessary to perform the two-step quantitative goodwill impairment test. Various factors are considered in the qualitative assessment, including macroeconomic conditions, financial performance, or a sustained decrease in share price. If as a result of the qualitative assessment, it is deemed more likely than not that the fair value of a reporting unit is less than its carrying amount, management will perform the quantitative test.

The quantitative goodwill impairment test, if necessary, involves a two-step process to identify goodwill impairment and measure the amount of goodwill impairment loss to be recognized, if any. The first step tests for potential impairment by comparing the fair value of the reporting unit with the reporting unit’s carrying value. If the fair value of the reporting unit exceeds the carrying value of the reporting unit’s net assets, goodwill is not impaired and no further testing is required. If the fair value of the reporting unit does not exceed the carrying value of the net assets assigned to the reporting unit, then we perform the second step of the impairment test in order to determine the implied fair value of the reporting unit's goodwill. The second step requires an assignment of the reporting unit’s fair value to the reporting unit’s assets and liabilities, using the relevant acquisition accounting guidance, to determine the implied fair value of the reporting unit’s goodwill. The implied fair value of the reporting unit’s goodwill is then compared with the carrying amount of the reporting unit’s goodwill, and if the carrying value of a reporting unit's goodwill exceeds its implied fair value, we record an impairment loss equal to the difference.

In the first step, the fair value of each of our reporting units is determined using both the income and market valuation approaches. We believe the income approach and the market approach are equally representative of the reporting unit’s fair value. Under the income approach, the fair value of the reporting unit is based on the present value of estimated future cash flows that the reporting unit is expected to generate over its remaining life. Under the market approach, the value of the reporting unit is based on an analysis that compares the value of the reporting unit to values of publicly-traded companies in similar lines of business. In the application of the income and market valuation approaches, we are required to make estimates of future operating trends and judgments on discount rates and other variables. Determining the fair value of a reporting unit is highly judgmental in nature and involves the use of significant estimates and assumptions. We base our fair value estimates on assumptions we believe to be reasonable, but unpredictable and inherently uncertain. Actual future results related to assumed variables could differ from these estimates. In addition, we make certain judgments and assumptions in allocating shared assets and liabilities to determine the carrying values for each of our reporting units.

Under the income approach, we calculate the fair value of a reporting unit based on the present value of estimated future cash flows. Cash flow projections are based on management's estimates of revenue growth rates and operating margins, taking into consideration industry and market conditions. The discount rate used is based on the weighted-average cost of capital, adjusted for the relevant risk associated with business-specific characteristics and the uncertainty related to the business's ability to execute on the projected cash flows. Under the market approach, we estimate the fair value based on market multiples of earnings derived from comparable publicly-traded companies with similar operating and investment characteristics as the reporting units, and then apply a control premium, which is determined by

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considering control premiums offered as part of the acquisitions that have occurred in market segments that are comparable with our reporting units. The income approach and the market approach are equally weighted to derive the fair value of the reporting unit.

During the fourth quarter of 2018, we performed a quantitative assessment for all of our reporting units: Routing, Switching, and Security. This quantitative assessment was performed by determining the fair value of each reporting unit using a combination of the income approach and the market approach. Based on the results of the quantitative assessments, we determined that the fair value of each reporting unit significantly exceeded its respective carrying value, resulting in no goodwill impairment.

- Inventory Valuation and Contract Manufacturer Liabilities: Inventory consists primarily of component parts to be used in the manufacturing process and finished goods in-transit, and is stated at lower of cost or net realizable value. A provision is recorded when inventory is determined to be in excess of anticipated demand or obsolete, to adjust inventory to its estimated realizable value. In determining the provision, we also consider estimated recovery rates based on the nature of the inventory. As of December 31, 2018 and December 31, 2017, our net inventory balances were $82.0 million and $97.8 million, respectively.

We establish a liability for non-cancelable, non-returnable purchase commitments with our contract manufacturers for quantities in excess of our demand forecasts or obsolete materials charges for components purchased by contract manufacturers based on our demand forecasts or customer orders. We also take estimated recoveries of aged inventory into consideration when determining the liability. As of December 31, 2018 and December 31, 2017, our contract manufacturer liabilities were $30.4 million and $22.0 million, respectively.

Significant judgment is used in establishing our forecasts of future demand, recovery rates based on the nature and age of inventory, and obsolete material exposures. We perform a detailed analysis and review of data used in establishing our demand forecasts. If the actual component usage and product demand are significantly lower than forecast, which may be caused by factors within and outside of our control, or if there were a higher incidence of inventory obsolescence because of rapidly changing technology and our customer requirements, we may be required to increase our inventory write-downs and contract manufacturer liabilities, which could have an adverse impact on our gross margins and profitability. We regularly evaluate our exposure for inventory write-downs and adequacy of our contract manufacturer liabilities. Inventory and supply chain management remains an area of focus as we balance the risk of material obsolescence and supply chain flexibility in order to reduce lead times.

- Revenue Recognition: We enter into contracts to sell our products and services, and while some of our sales agreements contain standard terms and conditions, there are agreements that contain non-standard terms and conditions and include promises to transfer multiple goods or services. As a result, significant interpretation and judgment are sometimes required to determine the appropriate accounting for these transactions, including: (1) whether performance obligations are considered distinct that should be accounted for separately versus together, how the price should be allocated among the performance obligations, and when to recognize revenue for each performance obligation; (2) developing an estimate of the stand-alone selling price, or SSP, of each distinct performance obligation; (3) combining c