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ADTRAN INC

Form 10-K

February 28, 2019

false FY ADTN ADTRAN INC 0000926282 --12-31 Yes Yes No Large Accelerated Filer false false false P5Y P3Y P3Y P3Y P2Y 2 2 P4Y P10Y P4Y P10Y P10Y P10Y P3Y P4Y P1Y P7Y P9Y P2Y P3Y P3Y P5Y P12Y P10Y P4Y10M13D P4Y1M6D P3Y11M4D 14.88 18.97 23.46 30.36 18.96 23.45 30.35 41.92 P5Y11M4D P5Y8M4D P3Y2M4D P2Y3M14D P6Y3M 0.2798 0.3158 0.0211 0.0299 0.0183 0.0249 0000926282 2018-01-01 2018-12-31 xbrli:shares 0000926282 2019-02-15 iso4217:USD 0000926282 2018-06-30 0000926282 2018-12-31 0000926282 2017-12-31 iso4217:USD xbrli:shares 0000926282 us-gaap:ProductMember 2018-01-01 2018-12-31 0000926282 us-gaap:ProductMember 2017-01-01 2017-12-31 0000926282 us-gaap:ProductMember 2016-01-01 2016-12-31 0000926282 us-gaap:ServiceMember 2018-01-01 2018-12-31 0000926282 us-gaap:ServiceMember 2017-01-01 2017-12-31 0000926282 us-gaap:ServiceMember 2016-01-01 2016-12-31 0000926282 2017-01-01 2017-12-31 0000926282 2016-01-01 2016-12-31 0000926282 us-gaap:CommonStockMember 2015-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2015-12-31 0000926282 us-gaap:RetainedEarningsMember 2015-12-31 0000926282 us-gaap:TreasuryStockMember 2015-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2015-12-31 0000926282 2015-12-31 0000926282 us-gaap:RetainedEarningsMember 2016-01-01 2016-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2016-01-01 2016-12-31 0000926282 us-gaap:TreasuryStockMember 2016-01-01 2016-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2016-01-01 2016-12-31 0000926282 us-gaap:CommonStockMember 2016-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2016-12-31 0000926282 us-gaap:RetainedEarningsMember 2016-12-31 0000926282 us-gaap:TreasuryStockMember 2016-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2016-12-31 0000926282 2016-12-31 0000926282 us-gaap:RetainedEarningsMember 2017-01-01 2017-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2017-01-01 2017-12-31 0000926282 us-gaap:TreasuryStockMember 2017-01-01 2017-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2017-01-01 2017-12-31 0000926282 us-gaap:CommonStockMember 2017-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2017-12-31 0000926282 us-gaap:RetainedEarningsMember 2017-12-31 0000926282 us-gaap:TreasuryStockMember 2017-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2017-12-31 0000926282 us-gaap:RetainedEarningsMember 2018-01-01 2018-12-31 0000926282 us-gaap:RetainedEarningsMember us-gaap:AccountingStandardsUpdate201409Member 2018-01-01 2018-12-31 0000926282 us-gaap:AccountingStandardsUpdate201409Member 2018-01-01 2018-12-31 0000926282 us-gaap:RetainedEarningsMember us-gaap:AccountingStandardsUpdate201601Member 2018-01-01 2018-12-31 0000926282 us-gaap:AccountingStandardsUpdate201601Member 2018-01-01 2018-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2018-01-01 2018-12-31 0000926282 us-gaap:TreasuryStockMember 2018-01-01 2018-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2018-01-01 2018-12-31 0000926282 us-gaap:CommonStockMember 2018-12-31 0000926282 us-gaap:AdditionalPaidInCapitalMember 2018-12-31 0000926282 us-gaap:RetainedEarningsMember 2018-12-31 0000926282 us-gaap:TreasuryStockMember 2018-12-31 0000926282 us-gaap:AccumulatedOtherComprehensiveIncomeMember 2018-12-31 0000926282 us-gaap:EmployeeStockOptionMember 2018-01-01 2018-12-31 0000926282 adtn:PerformanceStockUnitsMember 2018-01-01 2018-12-31 adtn:Customer xbrli:pure 0000926282 us-gaap:CreditConcentrationRiskMember us-gaap:AccountsReceivableMember 2018-01-01 2018-12-31 0000926282 us-gaap:CreditConcentrationRiskMember us-gaap:AccountsReceivableMember 2017-01-01 2017-12-31 0000926282 us-gaap:LandAndBuildingMember srt:MinimumMember 2018-01-01 2018-12-31 0000926282 us-gaap:LandAndBuildingMember srt:MaximumMember 2018-01-01 2018-12-31 0000926282 adtn:OfficeMachineryAndEquipmentMember srt:MinimumMember 2018-01-01 2018-12-31 0000926282 adtn:OfficeMachineryAndEquipmentMember srt:MaximumMember 2018-01-01 2018-12-31 0000926282 adtn:EngineeringMachineryAndEquipmentMember srt:MinimumMember 2018-01-01 2018-12-31 0000926282 adtn:EngineeringMachineryAndEquipmentMember srt:MaximumMember 2018-01-01 2018-12-31 0000926282 adtn:ComputerSoftwareMember srt:MinimumMember 2018-01-01 2018-12-31 0000926282

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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

FOR ANNUAL AND TRANSITION REPORTS PURSUANT TO SECTION 13 OR 15(d) OF THE
SECURITIES EXCHANGE ACT OF 1934

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the Fiscal Year Ended December 31, 2018

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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 000-24612

ADTRAN, Inc.

(Exact name of registrant as specified in its charter)

Delaware
(State of Incorporation)

63-0918200
(I.R.S. Employer Identification Number)

901 Explorer Boulevard
Huntsville, Alabama 35806-2807

(256) 963-8000
(Registrant's telephone number, including area code)

(Address of principal executive offices, including zip code)
Securities registered pursuant to Section 12(b) of the Act:

<u>Title of Each Class:</u>	<u>Name of Each Exchange on which Registered</u>
Common Stock, par value \$0.01 per share	NASDAQ Global Select Market
Securities registered pursuant to Section 12(g) of the Act: None	

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15 (d) of the Securities Exchange Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the 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 filing requirements for the past 90 days. Yes No

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

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K 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.

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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 Company
Emerging growth company	

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.

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

The aggregate market value of the registrant's outstanding common stock held by non-affiliates of the registrant on June 30, 2018 was \$ based on a closing market price of \$14.85 as quoted on the NASDAQ Global Select Market. There were 47,777,043 shares of common stock outstanding as of February 15, 2019.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the Annual Meeting of Stockholders to be held on May 8, 2019 are incorporated herein by reference in Part III.

ADTRAN, Inc.

Annual Report on Form 10-K

For the Fiscal Year Ended December 31, 2018

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PART I

ITEM 1. BUSINESS

Overview

ADTRAN is a leading global provider of networking and communications equipment, serving a diverse domestic and international customer base in 68 countries that includes Tier 1, 2 and 3 service providers, cable/MSOs and distributed enterprises. Our innovative solutions and services enable voice, data, video and internet communications across a variety of network infrastructures and are currently in use by millions of users worldwide. We support our customers through our direct global sales organization and our distribution networks. Our success depends upon our ability to increase unit volume and market share through the introduction of new products and succeeding generations of products having lower selling prices and increased functionality as compared to both the prior generation of a product and to the products of competitors. In order to service our customers and build revenue, we are constantly conducting research and development of new products addressing customer needs and testing those products for the particular specifications of the particular customers. In addition to our corporate headquarters in Huntsville, Alabama, we have research and development (R&D) facilities in strategic global locations.

We are focused on being a top global supplier of access infrastructure and related value-added solutions from the cloud edge to the subscriber edge. We offer a broad portfolio of flexible software and hardware network solutions and services that enable service providers to meet today's service demands, while enabling them to transition to the fully converged, scalable, highly automated, cloud-controlled voice, data, internet and video network of the future.

Our business operates under two reportable segments: Network Solutions and Services & Support. We also report revenue across three categories – Access & Aggregation, Subscriber Solutions & Experience (formerly Customer Devices) and Traditional & Other Products. These segments and categories are discussed in detail below.

ADTRAN was incorporated under the laws of Delaware in November 1985 and began operations in January 1986. Headquartered in Huntsville, Alabama, ADTRAN anchors Cummings Research Park—the second largest high-tech center in the U.S. and fourth largest in the world. The mailing address is 901 Explorer Boulevard, Huntsville, Alabama, 35806. Our telephone number at that location is (256) 963-8000. Our website is www.adtran.com.

A copy of this Annual Report on Form 10-K, as well as our Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and any amendments to these reports, are available free of charge on the Internet under the Investor Relations section of our website, www.adtran.com, as soon as reasonably practicable (generally, within one day) after we electronically file these reports with, or furnish these reports to, the Securities and Exchange Commission (SEC). The reference to our website address does not constitute incorporation by reference of the information contained on the website, which information should not be considered part of this document. You may also read and copy any

materials we file with the SEC at the SEC's Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. The public may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC maintains a website (www.sec.gov) that contains our reports, proxy and information statements, and other information that we have filed electronically with the SEC.

Revenue Segments

Our business operates under two reportable segments: Network Solutions and Services & Support.

Network Solutions

Our Network Solutions software and hardware products provide solutions supporting fiber-, copper- and coaxial-based infrastructures and a growing number of wireless solutions, lowering the overall cost to deploy advanced services across a wide range of applications for Carrier and Cable/MSO networks. We are accelerating the industry's transition to open, programmable and scalable networks. ADTRAN offers both chassis-based networks solutions, such as our Total Access 5000 (TA5000) and hiX families, as well as disaggregated network solutions which leverage ADTRAN's Software Defined Access (SD-Access) architecture which combines modern web-scale technologies with open-source platforms to facilitate rapid innovation in multi-technology, multi-vendor environments.

The Mosaic cloud platform and Mosaic OS, combined with programmable network elements, provide operators with a highly agile, open-services architecture. This enables operators to better compete with web-scale companies by reducing the time and cost to onboard new services, technologies, and supply partners as they strive to reduce operational costs.

Also included in this category are our subscriber solutions that terminate the broadband access in the home and/or business. These include open-source connected home and enterprise platforms, cloud services, Wi-Fi and software applications and services.

Services & Support

To complement our Network Solutions portfolio and to enable our service provider customers to accelerate time to market, reduce costs and improve customer satisfaction, we offer a complete portfolio of services. These include consulting, managed services, solutions integration, network implementation and maintenance services.

ADTRAN's consulting services allow service providers to leverage ADTRAN's 30 plus years of network engineering expertise to build and deploy best of breed networks. Our ADTRAN NetAssure Program offers a variety of ways to leverage ADTRAN networking expertise applied to networks. One aspect, the resident engineering services, provides an on-site ADTRAN engineer, whose goal is to drive customer success by serving as the single point of contact for product knowledge, on-going network troubleshooting, and technical expertise, enabling service providers to gain a strategic competitive advantage from our products.

ADTRAN's solution's integration services enable operators to architect and build the open distributed access networks of the future. Our solutions integration offerings include our SD-Access Accelerator. These solutions enable service providers to explore the benefits of SD-Access without impacting their network. The SD-Access Accelerator includes system integration services with a compact pod that includes all of the equipment needed to evaluate an SDN-Enabled Broadband Access (SEBA) solution. This fully functional SD-Access system enables service providers to cost-effectively perform functional testing, develop transition plans, access a variety of applications and environments and evaluate fully functional disaggregated solutions.

ADTRAN Network Implementation Services enables our operators to increase service delivery velocity and improved their return on investment while providing higher customer satisfaction. ADTRAN offers a full turn-key suit of services to help operators accelerate deployment of their networks including planning, engineering, construction, installation, test, turn-up and provisioning services. Additionally, we partner with customers to tailor a program to each specific service-delivery need.

Our maintenance services are specifically designed to protect customers' networks from unnecessary downtime through SLA services, such as managed spares and remote or on-site technical support beyond our standard warranty coverage. Network Care Plans offer prioritized remote or on-site support, after-hours emergency support, advanced replacement, early access to software patches and upgrades, as well as bundled training and network management vouchers with the option of Element Management as part of the support plan.

We also offer a full spectrum of professional services for end-user customers or operators reselling to end-user customers under the ProServices umbrella. ADTRAN ProServices is a comprehensive and flexible service program designed to offer complete networking lifecycle support. The ProServices portfolio consists of three distinct service offerings: ProStart (end-user network implementation), ProCare (maintenance and support), and ProCloud (cloud-based managed services). Our ProCare program, which is available to all of our customers, is geared towards customer premises equipment and guarantees priority access to technical support engineers.

Revenue Categories

In addition to reporting our Network Solutions and Services & Support segments, we report revenue across three categories – Access & Aggregation, Subscriber Solutions & Experience (formerly Customer Devices) and Traditional & Other Products.

Access & Aggregation solutions are used by service providers to connect their network infrastructure to subscribers. This category includes software- and hardware-based products and services that aggregate and/or originate access technologies. The portfolio of ADTRAN solutions within this category includes a wide array of modular or fixed physical form factors designed to deliver the best technology and economic fit based on the target subscriber density and environmental conditions.

The Access & Aggregation category includes product and service families such as:

- ◆ Mosaic-branded network management and subscriber services control and orchestration software within SD-Access architectures;
- ◆ SDX series of SDN-controlled programmable network elements that form the hardware components within SD-Access architectures;
- ◆ A5000 Series Fiber to the Premises (FTTP) and Fiber to the Node (FTTN) Multi-Service Access Nodes (MSAN);
- ◆ iX 5600 Series fiber aggregation and FTTN MSAN;
- ◆ Fiber to the Distribution Point (FTTdp) Gfast Distribution Point Units (DPUs);
- ◆ GPON, EPON and 10G PON Optical Line Terminals (OLTs);

Optical Networking Edge (ONE) aggregation;
IP-based Digital Subscriber Line Access Multiplexers (DSLAMs);
Cabinet and Outside-Plant (OSP) enclosures and services;
Pluggable optical transceivers (i.e., SFP, SFP+, XFP, QSFP), cables and other miscellaneous materials;
Planning, engineering, program management, maintenance, installation and commissioning services to implement customer network solutions;
Other products and services that are generally applicable to Access & Aggregation.

Subscriber Solutions & Experience (formerly Customer Devices) includes open-source connected home platforms, cloud services and any of our solutions and services that deliver residential and/or enterprise subscribers an immersive and interactive broadband experience from the service provider's access network. These products, software, and services include our portfolio of SmartRG solutions and applications, NetVanta Enterprise IP business gateways, access routers, Ethernet switches, ProCloud services offerings, residential and enterprise operating systems (such as SmartOS and AOS), Bluesocket Wi-Fi portfolio, service provider and Cable/MSO Optical Network Terminals (ONTs) as well as related software applications and services. In alignment with our increased focus on enhancing customer experience for both business and consumer broadband customers as well as the addition of SmartRG during 2018, Customer Devices will now be known as Subscriber Solutions & Experience, as this more accurately represents this revenue category and our vision moving forward.

The Subscriber Solutions & Experience category includes products and services such as:

- Cloud-based SaaS management platforms for service providers to manage residential and enterprise networks;

SaaS platforms for subscriber and network analytics collection used to enhance network operations and customer experience;

SmartOS-branded embedded software licensing for residential and enterprise gateway and Wi-Fi devices;

Broadband customer premises solutions, including GPON, XGS-PON, NG-PON2, EPON and 10G EPON and point-to-point Ethernet Optical Network Terminals (ONTs);

Radio Frequency over Glass (RFoG) MicroNodes;

Wi-Fi enabled residential gateway products and accessories across xDSL, Ethernet, DOCSIS, LTE, and fiber technologies;

Enterprise Wi-Fi access points and associated powering and switching infrastructure;

Enterprise Session Border Controller (eSBC) device platforms and software;

Branch office business routers;

Carrier Ethernet services termination devices;

Voice over Internet Protocol (VoIP) media gateways;

ProServices pre-sale and post-sale technical support;

Planning, engineering, program management, maintenance, installation and commissioning services to implement customer devices solutions into consumer, small business and enterprise locations;

Other products, software, and services applicable to subscriber solutions and experience.

Traditional & Other Products generally include a mix of prior-generation technologies' products and services, as well as other products and services that do not fit within the Access & Aggregation or Subscriber Solutions & Experience categories.

The Traditional & Other Products category includes products and services such as:

Time Division Multiplexed (TDM) and Asynchronous Transfer Mode (ATM)-based aggregation systems and customer devices;

High-bit-rate digital subscriber line (HDSL), asymmetric digital subscriber line (ADSL) and other mature technologies used to deliver business and residential services over service provider access and customer networks;

Other products and services outside the Access & Aggregation and Subscriber Solutions & Experience categories.

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Access & Aggregation

With more than 30 years of domain expertise in the access network, ADTRAN understands and believes in the transformative effects of broadband and how our technology helps to energize communities, rebuild urban centers, revitalize schools, stimulate economic growth and deliver innovative residential and business services to advance human progress. Our Access & Aggregation solutions enable service providers to connect to their customers, who require high-speed broadband connectivity whenever and wherever they want, and meet this demand with a unique portfolio of innovative solutions. Our products and services solutions enable service providers to upgrade their networks to next-generation fiber and/or to maximize their current network investment while transitioning to next-generation virtualized networks.

Next-Generation 10 Gigabit (G) Passive Optical Network (PON) technologies enable access speeds up to 10 times that of existing FTTP technologies, providing the network scale and agility needed to support a web-driven world. The primary value of next-gen PON technologies like NG-PON2 and XGS-PON is the ability to serve a mix of residential, business and backhaul services over a common network, enabling operators to double the life of their fiber investments.

Our market leadership is exemplified by our comprehensive portfolio of 10G-EPON, XGS-PON, NG-PON2 technologies and global position in hardened OSP solutions, as well as our role as a key provider for some of the largest vectoring and super-vectoring deployments. We are driving the adoption of industry-leading technology innovations like NG-PON2 and XGS-PON, as well as 10G EPON, which support multi-gigabit per second services over fiber, as well as next-generation Gfast solutions to support gigabit services over existing phone lines and TV cabling.

The cable/multiple-service operator (cable/MSO) market represents a growing portion of the fixed broadband access industry. In March 2018, we acquired the market-leading EPON business and certain assets for North America from Sumitomo Electric Industries Ltd., which, combined with our organic fiber access product portfolio and our distributed access expertise, presents new opportunities in the cable/MSO market. As cable/MSOs define their technological future, the concept of fiber deep and distributed access take on more prominence. Fiber deep is a strategy of pushing fiber deeper into the access network. This approach hinges on distributing broadband access electronics outdoors, hanging from poles, overhead lines or in small pits along walkways. Over 20 years of telco market FTTN deployment experience has allowed us to become an expert in deploying these challenging distributed access architectures. Fiber deep and distributed access architectures (DAA) provide cable/MSOs the solutions required for their relevancy in the gigabit age and lay the path to a software-defined future.

Gfast continues to gain momentum among service providers for its ability to enable Gigabit speeds over existing phone and TV infrastructure. We are a leader in the development of this technology and in 2018, we introduced the industry's first commercially-available, gigabit-capable, second-generation Gfast solution and delivered the most advanced Gfast DPUs to help connect Australia's national broadband network (nbn) with Gigabit-capable service.

VDSL2 vectoring and super-vectoring have become the fastest growing products in our company's history, with nearly 20 million ports shipped since 2013. These advanced broadband technologies help support broadband penetration initiatives, including ultra-fast broadband speeds over existing infrastructure. They drastically reduce zoning issues, build delays and tenant disruption, helping advance the "Gigabit Society" globally.

SDN and network functions virtualization (NFV) are two key network architectural approaches that are enabling service providers and enterprises to create more agile, programmable networks. SDN enables highly scalable network programmability to facilitate service automation. NFV virtualizes functions typically performed in proprietary hardware and moves them into software functions that run on general-purpose hardware. The combination of these two technologies enables user-driven networks where subscribers can self-activate a wide range of sophisticated on-demand services without having to engage the service provider.

ADTRAN Mosaic™ is the industry's most open and complete SD-Access solution that natively integrates a complete FTTx portfolio with an open-source SDN controller. It is also the most awarded SD-Access solution in the industry with over a dozen industry awards. This breakthrough innovation supports the rapid service creation and delivery of broadband and business services at web-scale. This solution is anchored by the Mosaic Cloud Platform (MCP) and the Mosaic Operating System (OS). The Mosaic Cloud Platform is built on an open, micro-services architecture that provides network management and SDN orchestration for the entire access network, from the cloud edge to the subscriber edge. It unlocks control and management functions from the underlying network elements, enabling a more flexible, agile services delivery environment. This provides a framework to support user-driven service models and a platform to deploy new network applications. Our Mosaic OS provides a consistent and field-proven feature set across a broad spectrum of network elements and access technologies. Its modular software architecture enables service providers to rapidly onboard new access technologies and introduce disruptive operational efficiencies while creating revenue-generating, on-demand applications across their entire access network.

Subscriber Solutions & Experience

The Subscriber Solutions & Experience portfolio includes a comprehensive array of software and hardware products and services typically found at the end-user premises that are used to terminate services from a service provider. Products in this category include residential and business gateways, and Wi-Fi access points that leverage cloud economics to better understand, optimize and manage subscriber experience, as well as broadband fiber ONTs, RFoG MicroNodes, routers, switches, and enterprise session border controllers. This category also includes our ProServices offerings that are discussed in detail under Services & Support.

In late 2018, we acquired SmartRG, an industry-leading provider of connected-home software platforms and cloud services. With this acquisition, ADTRAN now offers a complete cloud-to-consumer portfolio of virtualized management, data analytics, Wi-Fi-enabled residential gateways and software platforms. Together, ADTRAN Mosaic and Smart OS provide comprehensive management and orchestration solutions—enabling service providers to deliver reliable bandwidth to every connected device in the network.

As a part of the SmartRG acquisition, our Subscriber Solutions & Experience portfolio now extends to cover several new product areas. We have added “best-in-class” SaaS management and analytics platforms that enable service providers to extend visibility into the subscriber premises and better enable customer service to ensure customer satisfaction. SmartOS is an open source-based embedded software platform aligned with the prpl Foundation. SmartRG is a key contributor to the prpl Foundation, which strives to develop, support, and promote a community-driven consortium with a focus on security and interoperability of embedded devices for the Internet of Things (IoT) and the smart society of the future. The SmartOS software platform can be licensed independently to run on third-party hardware platforms and delivered as a part of our extensive portfolio of Wi-Fi-enabled residential and enterprise gateway platforms that extend across xDSL, Ethernet, DOCSIS, LTE and fiber access technologies.

Our portfolio also includes carrier class enterprise Wi-Fi and IP business gateways and access routers and enterprise communications solutions that enable businesses to construct voice, data and video networks at a single site or among distributed sites. These products are sold through service providers as part of bundled business services or through our network of Value Added Resellers (VARs), managed service providers (MSPs) and system integrators.

Our ONTs are designed to address the fiber access market with industry-leading voice, data and video capabilities. These ONTs include both indoor and outdoor models for residential and business applications. With several different series of GPON, XGS-PON, NG-PON2, EPON, 10G EPON and Active Ethernet ONTs, carriers benefit from high data rates of fiber optic transmission and the flexibility offered by our portfolio of Ethernet-based systems that can be easily configured for new, customized service offerings.

Our portfolio of RFoG MicroNodes enables cable/MSOs to transition to EPON/fiber networks while still retaining the ability to deliver traditional RF video services over their next-generation networks.

Traditional & Other Products

These products generally utilize legacy technologies such as HDSL, ADSL, Time Division Multiplexed (TDM) or Asynchronous Transfer Mode (ATM), and represent a prior generation of a current product or are products that do not fit under either Access & Aggregation or Subscriber Solutions & Experience.

Customers

We have a diverse global customer base that includes Tier 1, 2 and 3 service providers, cable/MSOs and distributed enterprises. Major service providers and many smaller providers typically require product approval before adopting a supply partner's products for use in their networks. The nature of our business involves a dynamic process of submitting new and succeeding generations of products for approval.

Two customers, CenturyLink, Inc. and Deutsche Telekom, AG, individually comprised more than 10 percent of our revenue in 2018. The revenues from these customers are reported in both our Network Solutions and Services & Support segments.

For a discussion of risks associated with customers, service providers and approval processes, see "Risk Factors – The lengthy sales and approval process required by major and other service providers for new products could result in fluctuations in our revenue," "Risk Factors – We depend heavily on sales to certain customers; the loss of any of these customers would significantly reduce our revenues and net income," and "Risk Factors – Consolidation and deterioration in the Competitive Local Exchange Carrier (CLEC) market could result in a significant decrease in our revenue," in Item 1A of this report.

Distribution, Sales and Marketing

We sell our products globally through our direct sales organization and our distribution network. Our direct sales organization supports major accounts and has offices in many domestic and international locations. Sales to most competitive service providers and independent telephone companies are fulfilled through a combination of direct sales and major technology distribution companies.

Before placing any orders, service providers typically require lengthy product qualification and standardization processes that can extend for several months or even years. Once approved, product orders are typically placed under single or multi-year supply agreements that are generally not subject to minimum volume commitments. Service providers generally prefer having two or more suppliers for most products. Therefore, individual orders are usually subject to competition based on some combination of total value, service, price, delivery and other terms.

End-user products are fulfilled through a combination of direct sales and major technology distribution companies. This is supported by a direct sales organization for major accounts and a channel-based sales organization to facilitate sales to our partners. MSPs, VARs and system integrators may be affiliated with the company as channel partners, or they may purchase from a distributor in an unaffiliated fashion. Affiliated partners participate with us at various program levels, based on sales volume and other factors, to receive benefits such as product discounts, market development funds, technical support and training. We maintain field offices worldwide to support direct sales,

distributors, MSPs, VARs and system integrators.

Outside of the United States, most service provider products are sold through our direct sales organization and end-user products are sold direct or through distribution arrangements customized for each region. Each region is supported by a field office that offers sales and support functions, and in some cases, warehousing and manufacturing support.

Our field sales organizations, distributors and service provider customers receive support from regional-based marketing, sales and customer support groups. Under certain circumstances, other headquarters personnel may be involved in sales and other activities.

Our services offerings can be purchased directly from us, or through one of our service providers, channel partners or distribution partners.

Research and Development

Rapidly changing technologies, evolving industry standards, changing customer requirements, and continuing developments in communications service offerings characterize the markets for our products. Our on-going ability to adapt to these changes and to develop new and enhanced products that meet or anticipate market demand is a significant factor influencing our competitive position and our prospects for growth.

During the years ended December 31, 2018, 2017 and 2016, product development expenditures totaled \$124.5 million, \$130.7 million and \$124.9 million, respectively. Our product development activities are an important part of our strategy. We plan to maintain an emphasis on product development each year to respond to rapidly changing technology and evolving industry standards. Our research and development and engineering functions are global. We maintain research and development functions in our Huntsville, Alabama headquarters and various other locations worldwide.

We strive to deliver innovative network access solutions that lower the total cost and reduce the time of deploying services, increase the level of performance achievable with established infrastructures, reduce operating and capital expenses for our customers, increase network bandwidth and functionality, and extend network reach. Our development process is conducted in accordance with ISO 9001, TL 9000, ISO 14001, and ISO 27001, all of which are international standards for quality and environmental management systems. Our corporate practices also conform to the rigorous General Data Protection Regulation (GDPR) requirements that protect digital data for all European Union (EU) citizens.

While we develop most of our products internally, in some cases, we license intellectual property (IP) or use Original Design Manufacturer (ODM) partners across certain products. Internal development on advanced technology products gives us more control over design and manufacturing issues, while for traditional designs, ODM and/or licensed IP provides us with the ability to leverage the economies of scale of our technology partners. This balanced approach to product development ensures we provide a “best-in-class” approach to our customers.

As we continue to create more software-based IP, such as our SDN/NFV portfolio, our use of “Lean Agile Practices” ensures we remain responsive and customer-focused. This enables continuous delivery so we can deliver products faster and more economically to our customers and the market.

Our ability to continually reduce product costs, while focusing on continuous delivery and quality, are important parts of our overall business strategy. Our product development efforts are often centered on entering a market with improved technology, allowing us to offer products at competitive prices. We then compete for market share. We continually re-engineer successive generations of existing products to improve our product performance, costs and value.

Development activities focus on solutions that support both existing and emerging communications industry technologies in segments that we consider viable revenue opportunities. We are actively engaged in developing and refining technologies to support data, voice, and video transport primarily over IP/Ethernet network architectures. This includes Ethernet aggregation, fiber optic transport and access, DSL and coaxial access, access routing, Ethernet switching, wireless local area networks (LAN), integrated access, converged services, VoIP, network management and professional services.

A centralized research function supports product development efforts throughout the company. This group guides our various product design and engineering teams in digital signal processing technologies, computer simulation and modeling, computer-aided design/computer-aided manufacturing (CAD/CAM) toolsets, custom semiconductor design, optical transceiver design, industry standards, technological forecasting, product development methods, and emerging networks standards.

Many communication requirements, processes and technologies are governed by Standards Development Organizations (SDOs). These SDOs consist of representatives from various manufacturers, service providers and testing laboratories working to establish specifications and compliance guidelines for emerging communications technologies. We are an active participant in several SDOs and have assisted with the development of worldwide standards in many technologies.

In 2018, we joined the Open Networking Foundation (ONF) as a strategic supply chain partner and advisory board member to help shape, design and integrate next-generation access solutions within the growing, worldwide open networking ecosystem. These efforts focus on virtualization and disaggregation of access networks with interoperable components from various partners. Otherwise, our SDO activities are primarily in the area of broadband access. This includes involvement with the ITU-Telecommunications sector (ITU-T), Alliance for Telecommunications Industry Standards (ATIS), European Telecommunications Standards Institute (ETSI), NICC (UK Interoperability Standards), and the Broadband Forum (BBF). We are involved in the evolution of optical access technologies, participating in activities in the ITU-T, Full Service Access Network (FSAN), Institute of Electrical and Electronics Engineers (IEEE) and BBF on next-generation PON. We are also involved in standards development efforts related to maximizing the bandwidth potential of the copper pair to enable new applications. We continue to be involved with the industry-wide interoperability, performance-testing, and system-level projects related to those standards in the BBF. We are also members of ATIS, MEF, Open Compute Project, Wi-Fi Alliance (WFA) and the ETSI Network Functions Virtualization Industry Specification Group (NFV-ISG).

For a discussion of risks associated with our research and development activities, see “Risk Factors – We must continue to update and improve our products and develop new products in order to compete and to keep pace with improvements in communications technology” and “Risk Factors – We engage in research and development activities to improve the application of developed technologies, and as a consequence may miss certain market opportunities enjoyed by larger companies with substantially greater research and development efforts which may focus on more leading edge development,” in Item 1A of this report.

Manufacturing and Operations

The principal steps in our manufacturing process include the purchase and management of materials, assembly, testing, final inspection, packing, and shipping. We purchase parts and components for the assembly of some products from a large number of suppliers through a worldwide sourcing program. Additionally, we manage a process which identifies the components that are best purchased directly by contract manufacturers for use in the assembly of our products to achieve manufacturing efficiency, quality and cost objectives. Certain key components used in our products are currently available from a single source, and other key components are available from only a limited number of sources. In the past, we have experienced delays in the receipt of certain key components, which has resulted in delays in related product deliveries. We attempt to manage these risks through developing alternative sources, by staging inventories at strategic locations, through engineering efforts designed to prevent the necessity of certain components, and by maintaining close contact and building long-term relationships with our suppliers.

We rely on subcontractors for assembly and testing of certain printed circuit board assemblies, sub-assemblies, chassis, enclosures and equipment shelves, and to purchase some of the raw materials used in such assemblies. We typically manufacture our lower-volume, higher-mix product assemblies at our manufacturing site in Huntsville, Alabama. We build and test new product prototypes and many of our initial production units for our products in Huntsville, and we later transfer the production of higher-volume, lower-mix assemblies to our subcontractors. Subcontract assembly operations can lengthen fulfillment cycle times, but we believe we can respond more rapidly to uncertainties in incoming order rates by selecting assembly subcontractors that have significant reserve capacity and flexibility. Our subcontractors have proven to be flexible and able to meet our quality requirements. We conduct the majority of transactions with our foreign suppliers in United States dollars.

We ship the majority of products to our U.S. customers from our facilities in Huntsville, Alabama, although we also fulfill customer orders from other locations near our customers' sites. The majority of our products shipped to Europe, the Middle East and Africa (EMEA) customers come from locations in that region. We also ship directly from subcontractors to a number of customers in the U.S. and international locations. Most of our facilities are certified pursuant to the most current releases of ISO 9001, TL 9000, ISO 14001 and ISO 27001. Our Huntsville, Alabama facilities and many of our key suppliers are U.S. Customs-Trade Partnership Against Terrorism (C-TPAT) certified. Our products are also certified to certain other telephone company standards, including those relating to emission of electromagnetic energy and safety specifications. We also comply with GDPR requirements in the EU.

For a discussion of risks associated with manufacturing activities, see “Risk Factors – Our strategy of outsourcing a portion of our manufacturing requirements to subcontractors located in various international regions may result in us not meeting our cost, quality or performance standards” and “Risk Factors – Our dependence on a limited number of suppliers for certain raw materials and key components may prevent us from delivering our products on a timely basis, which could have a material adverse effect on customer relations and operating results,” in Item 1A of this report.

Competition

We compete in markets for networking and communications services and solutions for service providers, businesses, government agencies, and other organizations worldwide. Our products and services provide solutions supporting voice, data and video communications across fiber-, copper-, coaxial- and wireless-based infrastructure, as well as across wide area networks, local area networks, and the internet.

The markets for our products are intensely competitive, and numerous competitors exist in each of our product segments. These competitive conditions have resulted in competitor consolidations, bankruptcies, and liquidations. Consumer acceptance of alternative communications technologies such as coaxial cable through cable/MSOs and cellular-based wireless services that compete with our products has grown in recent years. Our development of 10G EPON and RFoG products better positions us to compete in the MSO market. Competition might further increase if new technologies emerge, new companies enter the market, or existing competitors expand their product lines.

We compete with a number of companies in the markets we serve. Key competitors in our core broadband access market include Arris, Calix, Casa Systems, Ciena, DASAN Zhone Solutions, Huawei, Nokia and ZTE. In the Subscriber Solutions & Experience segment, our primary competitors include Arris, Calix, Cisco, Ribbon Communications, Hewlett Packard Enterprise, Technicolor and Ubiquiti Networks. In addition to these OEM vendors, we face increasing competition from various ODM vendors who are being engaged directly by some of our service provider customers. Some of these companies compete in a single product segment, while others compete across multiple product lines. Competitors of our Services & Support business include Ericsson, Fujitsu Network Communications, Nokia and Calix.

For further discussion of risks associated with our competition, see “Risk Factors – We must continue to update and improve our products and develop new products in order to compete and to keep pace with improvements in communications technology” and “Risk Factors – We compete in markets that have become increasingly competitive, which may result in reduced gross profit margins and market share,” in Item 1A of this report.

Seasonality

We have experienced quarterly fluctuations in customer activity due to seasonal considerations. We typically experience reductions in order volume toward the beginning and end of the calendar year, which may result in lower revenues in the first and fourth quarters of our fiscal year. These seasonal effects may vary and do not always correlate to our operating results. Accordingly, they should not be considered a reliable indicator of our future revenue or operating results.

Foreign Currency

We record transactions denominated in foreign currencies on a monthly basis using the exchange rates from throughout the year. Assets and liabilities denominated in foreign currencies are re-measured at the balance sheet dates using the closing rates of exchange between those foreign currencies and the functional currency with any transaction gains or losses reported in other income (expense). Our primary exposures to foreign currency exchange rate movements are with our German subsidiary, whose functional currency is the Euro; our Australian subsidiary, whose functional currency is the Australian dollar; and our Mexican subsidiary, whose functional currency is the United States dollar. Adjustments resulting from translating financial statements of international subsidiaries are recorded as a component of accumulated other comprehensive income (loss).

Backlog and Inventory

A substantial portion of our shipments in any fiscal period relates to orders received and shipped within that fiscal period for customers under agreements containing non-binding purchase commitments. Further, a significant

percentage of orders require delivery within a few days. These factors normally result in very little order backlog or order flow visibility. Additionally, backlog levels may vary because of seasonal trends, the timing of customer projects and other factors that affect customer order lead times. We believe that because we fill a substantial portion of customer orders within the fiscal quarter of receipt, a backlog is not a meaningful indicator of actual sales for any succeeding period.

To meet this type of demand, we have implemented supply chain management systems to manage the production process. We maintain substantial inventories of raw materials for long lead-time components to support this demand and avoid expedite fees. We also maintain substantial finished goods inventories. Our practice of maintaining sufficient inventory levels to assure prompt delivery of our products and services increases the amount of inventory that may become obsolete. The obsolescence of this inventory may require us to write down the value of the obsolete inventory, which may have an adverse effect on our operating results.

For further discussion of risks associated with managing our inventory, see “Risk Factors – Managing our inventory is complex and may include write-downs of excess or obsolete inventory,” in Item 1A of this report.

Government Regulation

Our products must comply with various regulations and standards established by communications authorities in various countries, as well as those of certain international bodies. For instance, environmental legislation within the EU may increase our cost of doing business as we amend our products to comply with these requirements. The EU issued directives on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS), Waste Electrical and Electronic Equipment (WEEE), and the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH). We continue to implement measures to comply with the RoHS directive, the WEEE directive and the REACH regulation as individual countries issue their implementation guidance.

For further discussion of risks associated with government regulation, see “Risk Factors – Our products may not continue to comply with evolving regulations governing their sale, which may harm our business” and “Risk Factors – Regulatory and potential physical impacts of climate change and other natural events may affect our customers and our production operations, resulting in adverse effects on our operating results,” in Item 1A of this report.

Employees

As of December 31, 2018, we had 1,900 full-time employees in the U.S. and our international subsidiaries located in North America, Latin America, EMEA and the Asia-Pacific (APAC) region. The majority of ADTRAN GmbH employees, our subsidiary in Germany, are subject to collective bargaining agreements of either the Association of Metal and Electrical Industry in Berlin and Brandenburg e.V. or NORDMETALL Association of Metal and Electrical Industry e.V. Additionally, a small number of our ADTRAN GmbH employees are represented by other collective bargaining agreements. We have never experienced a work stoppage, and we believe that our relationship with our employees is good.

We also utilize contractors and temporary employees domestically and internationally in various manufacturing, engineering, sales, and general and administrative capacities, as needed.

Intellectual Property

The ADTRAN corporate logo is a registered trademark of ADTRAN. The name “ADTRAN” is a registered trademark of ADTRAN. A number of our product identifiers and names also are registered, and as a result of a recent acquisition discussed in the Subscriber Subscriptions & Experiences section, we acquired ownership of the registered “SmartRG” trademark. We claim rights to a number of unregistered trademarks as well.

We own over 600 patents worldwide related to our products and over 90 additional pending patent applications. Our patents expire at various dates between January 2019 and July 2037. We will continue to seek additional patents from time to time-related to our research and development activities. We do not derive any material amount of revenue from the licensing of our patents.

We protect our intellectual property and proprietary rights in accordance with good legal and business practices. We believe, however, that our competitive success will not depend on the ownership of intellectual property, but instead will depend primarily on the innovative skills, technical competence and marketing abilities of our personnel.

The communications industry is characterized by the existence of an ever-increasing volume of patent litigation and licensing activities. On occasion, we receive and may continue to receive, notices of claims alleging that we are infringing upon patents or other intellectual property. We cannot predict whether we will prevail in any claims or litigation over alleged infringements, or whether we will be able to license any valid and infringed patents, or other intellectual property, on commercially reasonable terms. It is possible that litigation may result in significant legal costs and judgments and that intellectual property infringement claims, or related litigation against or by us could have a material adverse effect on our business and operating results.

For a discussion of risks associated with our intellectual property and proprietary rights, see “Risk Factors – Our failure to maintain rights to intellectual property used in our business could adversely affect the development, functionality, and commercial value of our products,” in Item 1A of this report.

ITEM 1A. RISK FACTORS

The Private Securities Litigation Reform Act of 1995 provides a safe harbor for forward-looking statements made by or on behalf of ADTRAN. ADTRAN and its representatives may from time to time make written or oral forward-looking statements, including statements contained in this report and our other filings with the SEC and other communications with our stockholders. Generally, the words, “believe,” “expect,” “intend,” “estimate,” “anticipate,” “will,” “may,” “could” and similar expressions identify forward-looking statements. We caution you that any forward-looking statements made by us or on our behalf are subject to uncertainties and other factors that could cause these statements to be wrong. Some of these uncertainties and other factors are listed below. Though we have attempted to list comprehensively these important factors, we caution investors that other factors may prove to be important in the future in affecting our operating results. New factors emerge from time to time, and it is not possible for us to predict all of these factors, nor can we assess the impact each factor or combination of factors may have on our business.

You are further cautioned not to place undue reliance on those forward-looking statements because they speak only of our views as of the date the statements were made. We undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law. The following are some of the risks that could affect our financial performance or could cause actual results to differ materially from those expressed or implied in our forward-looking statements.

Our operating results may fluctuate in future periods, which may adversely affect our stock price.

Our operating results have been and will continue to be subject to quarterly and annual fluctuations as a result of numerous factors. These factors include, but are not limited to:

- fluctuations in demand for our products and services, especially with respect to significant network expansion projects undertaken by service providers;
- continued growth of communications network traffic and the adoption of communication services and applications by enterprise and consumer end users;
- changes in sales and implementation cycles for our products and reduced visibility into our customers’ spending plans and associated revenue;
- reductions in demand for our traditional products as new technologies gain acceptance;
- our ability to maintain appropriate inventory levels and purchase commitments;
- price and product competition in the communications and networking industries, which can change rapidly due to technological innovation;
- the overall movement toward industry consolidation among both our competitors and our customers;
- our dependence on sales of our products by channel partners, the timing of their replenishment orders, the potential for conflicts and competition involving our channel partners and large end-user customers and the potential for consolidation among our channel partners;
- variations in sales channels, product cost or mix of products and services sold;
- delays in receiving acceptance from certain customers as defined under contract, for shipments or services performed near the end of a reporting period;
- our ability to maintain high levels of product support and professional services;
- manufacturing and customer order lead times, and potential restrictions in the supply of key components;
- fluctuations in our gross margin and the factors that contribute to this as described below;
- our ability to achieve cost reductions;
- the ability of our customers, channel partners, and suppliers to obtain financing or to fund capital expenditures;
- our ability to execute on our strategy and operating plans;
- benefits anticipated from our investments in engineering, sales and marketing activities;
- the effects of climate change and other natural events;

the effect of political or economic conditions, including the effect of tariffs or so-called “trade wars” on us and our supply chain, acts of war, terrorist attacks, or other unrest in certain international markets; and changes in tax laws and regulations, or accounting pronouncements.

As a result, operating results for a particular future period are difficult to predict, and prior results are not necessarily indicative of results to be expected in future periods. Any of the above-mentioned factors, or other factors discussed elsewhere in this document, could have a material adverse effect on our business, results of operations, financial condition and cash flow that could adversely affect our stock price.

Our revenue for a particular period can be difficult to predict, and a shortfall in revenue may harm our operating results.

As a result of the many factors discussed in this report, our revenue for a particular quarter is difficult to predict and will fluctuate from quarter to quarter. Our typical pattern of customer orders requests product delivery within a short period following receipt of an order. Consequently, we do not typically carry a significant order backlog and are dependent upon obtaining orders and completing delivery in accordance with shipping terms that are predominantly within each quarter to achieve our targeted revenues. Our net sales may grow at a slower rate than in previous quarters or may decline. Our deployment/installation cycle can vary depending on the customer’s schedule, site readiness, network size and complexity and other factors, which can cause our revenue to fluctuate from period to period. Our ability to meet financial expectations could also be affected if the variable sales patterns seen in prior quarters recur in future quarters. We have experienced periods of time during which manufacturing issues have delayed shipments, leading to variable shipping patterns. In addition, to the extent that manufacturing issues and any related component shortages result in delayed shipments in the future, and particularly in quarters in which we and our subcontractors are operating at higher levels of capacity, it is possible that revenue for a quarter could be adversely affected, and we may not be able to remediate the conditions within the same quarter.

In the past, under certain market conditions, long manufacturing lead times have caused our customers to place the same order multiple times. When this multiple ordering occurs, along with other factors, it may cause difficulty in predicting our sales and, as a result, could impair our ability to manage parts inventory effectively.

We plan our operating expense levels based primarily on forecasted revenue levels. These expenses and the impact of long-term commitments are relatively fixed in the short term. A shortfall in revenue could lead to operating results being below expectations because we may not be able to quickly reduce these fixed expenses in response to short-term business changes.

General economic conditions may reduce our revenues and harm our operating results.

Economic conditions may contribute to a slowdown in communications industry spending, including specific market segments in which we operate. The potential reoccurrence of these trends and their duration and depth are difficult to predict. Capital spending for network infrastructure projects of our largest customers could be delayed or canceled in response to reduced consumer spending, tight capital markets or declining liquidity trends. Sustained trends of this nature could have a material, adverse effect on our revenues, results of operations, financial condition and cash flow.

Our exposure to the credit risks of our customers and distributors may make it difficult to collect accounts receivable and could adversely affect our operating results, financial condition and cash flow.

Most of our sales are made on an open credit basis, generally with payment terms of 30 days in the U.S. and typically longer in many geographic markets outside the U.S. As our international sales grow, our total accounts receivable balance will likely increase. Our days sales outstanding (DSO) could also increase as a result of a greater mix of international sales. Additionally, international laws may not provide the same degree of protection against defaults on accounts receivable as provided under U.S. laws governing domestic transactions; therefore, as our international business grows, we may be subject to higher bad debt expense compared to historical trends. Overall, we monitor individual customer payment capability in granting such open credit arrangements, seek to limit such open credit to amounts that we believe customers can pay, and maintain reserves we believe are adequate to cover exposure for doubtful accounts. In the course of our sales to customers, we may encounter difficulty collecting accounts receivable and could be exposed to risks associated with uncollectible accounts receivable due to various reasons, including potential declining operating cash flows or bankruptcy filings of our customers. We may be exposed to similar credit risks relating to collections from distributors of our products, and we apply similar processes to monitor and reserve for any exposures. Turmoil in the financial markets could impact certain of our customers' ability to maintain adequate credit facilities with financial institutions, thereby potentially impacting their ability to pay their debts. While we attempt to monitor these situations carefully and attempt to take appropriate measures to collect accounts receivable balances, there are no assurances we can avoid accounts receivable write-downs or write-offs of doubtful accounts as a result of declining financial conditions for our customers, including bankruptcy. Such write-downs or write-offs could negatively affect our operating results for the period in which they occur, and could potentially have a material adverse effect on our results of operations, financial condition and cash flow.

We expect gross margins to vary over time, and our levels of product and services gross margins may not be sustainable.

Our level of gross margins may not be sustainable and may be adversely affected by numerous factors, including:

- changes in customer, geographic, or product or services mix, including software and the mix of configurations and professional services revenue within each product group;
- mix of domestic versus foreign sales;
- introduction of new products by competitors, including products with price-performance advantages;
- our ability to reduce product cost;
- increases in labor or material cost, including increases in material costs resulting from tariffs;
- foreign currency exchange rate movements;
- expediting costs incurred to meet customer delivery requirements;
- excess inventory and inventory holding charges;
- obsolescence charges;
- changes in shipment volume;
- our ability to absorb fixed manufacturing costs during short-term fluctuations in customer demand;
- loss of cost savings due to changes in component pricing or charges incurred due to inventory holding periods if parts ordering does not correctly anticipate product demand;
- lower than expected benefits from value engineering;
- increased price competition, including competitors from Asia, specifically China;
- changes in distribution channels;
- increased warranty cost;
- liquidated damages costs relating to customer contractual terms; and

our ability to manage the impact of foreign currency exchange rate fluctuations relating to our accounts receivable and accounts payable.

We must continue to update and improve our products and develop new products to compete and to keep pace with improvements in communications technology.

The markets for our products are characterized by rapidly changing technology, evolving industry standards, and continuing improvements in the communications service offerings of service providers. If technologies or standards applicable to our products, or service provider offerings based on our products, become obsolete or fail to gain widespread commercial acceptance, our existing products or products under development may become obsolete or unmarketable. Moreover, the introduction of products embodying new technologies, the emergence of new industry standards, or changes in service provider offerings could adversely affect our ability to sell our products. For instance, we offer a large number of products that apply primarily to the delivery of high-speed digital communications over the local loop utilizing copper wire. We compete favorably with our competitors by developing a high-performance line of these products. We market products that apply to fiber optic transport in the local loop. We expect, however, that use of coaxial cable and fixed and mobile wireless access in place of local loop access will increase. Also, MSOs are increasing their presence in the local loop. To meet the requirements of these new delivery systems and to maintain our market position, we expect to continue to develop new products and/or modify existing products. We expect that the addition of fiber-based products focused on the cable MSO operators, using EPON and RFOG technologies, and fixed wireless access solutions will better position us to benefit from spending in these adjacent markets.

Our sales and profitability in the past have, to a significant extent, resulted from our ability to anticipate changes in technology, industry standards and service provider offerings, and to develop and introduce new and enhanced products. Our continued ability to adapt will be a significant factor in maintaining or improving our competitive position and our prospects for growth. We cannot assure that we will be able to respond effectively to changes in technology, industry standards, service provider offerings or new product announcements by our competitors. We also cannot assure that we will be able to successfully develop and market new products or product enhancements, or that these products or enhancements will achieve market acceptance. Any failure by us to continue to anticipate or respond in a cost-effective and timely manner to changes in technology, industry standards, service provider offerings, or new product announcements by our competitors, or any significant delays in product development or introduction, could have a material adverse effect on our ability to competitively market our products and on our revenues, results of operations, financial condition and cash flow.

Our products may not continue to comply with evolving regulations governing their sale, which may harm our business.

Our products must comply with various regulations, regional standards established by communications authorities, import/export control authorities or other authorities who control the execution of trade agreements in various countries, as well as those of certain international bodies. Although we believe our products are currently in compliance with domestic and international standards and regulations in countries in which we currently sell, there can be no assurance that we will be able to design our products to comply with evolving standards and regulations in the future. Changes in domestic or international communications regulations, tariffs, potential changes in trade policies by the U.S. and other nations, application requirements, import/export controls or expansion of regulation to new areas, including access, communications or commerce over the Internet, may affect customer demand for our products or slow the adoption of new technologies which may affect our sales. Further, the cost of complying with the evolving standards and regulations, or the failure to obtain timely domestic or foreign regulatory approvals or certification such that we may not be able to sell our products where these standards or regulations apply, may adversely affect our revenues, results of operations, financial condition and cash flow.

We are subject to complex and evolving U.S. and foreign laws and regulations regarding privacy, data protection and other matters. Violations of these laws and regulations may harm our business.

A wide variety of provincial, state, national and international laws and regulations apply to the collection, use, retention, protection, disclosure, transfer and other processing of data, including personal data. Foreign data protection, privacy and other laws and regulations, including the European Union's (EU) recently enacted General Data Protection Regulation, are often more restrictive than those in the U.S. These data protection and privacy-related laws and regulations are varied, evolving, can be subject to significant change, may be augmented or replaced by new or additional laws and regulations, and may result in ever-increasing regulatory and public scrutiny and escalating levels of enforcement and sanctions. Any significant change to applicable laws, regulations, or industry practices regarding our employees' and users' data could require us to modify our business, products, or services offered, potentially in a material manner, and may limit our ability to develop new products, services, and features. There is also a risk that we, directly or as the result of a third-party service provider we use, could be found to have failed to comply with the laws and regulations applicable in a jurisdiction regarding the collection, consent, handling, transfer or disposal of personal data. If we violate these laws and regulations, governmental authorities in the U.S., the EU and elsewhere could seek to impose civil and/or criminal fines and penalties which could have an adverse effect on our reputation, as well as, our results of operations, financial condition and cash flow.

Failure to comply with the U.S. Foreign Corrupt Practices Act and similar laws associated with our global activities could subject us to penalties or other adverse consequences.

A significant portion of our total revenues is generated from sales outside of the U.S. As a result, we are subject to the U.S. Foreign Corrupt Practices Act (FCPA), which prohibits U.S. companies and their intermediaries from making corrupt payments to foreign officials for the purpose of directing, obtaining or keeping business, and requires companies to maintain reasonable books and records and a system of internal accounting controls. The FCPA applies to companies, individual directors, officers, employees and agents. Under the FCPA, U.S. companies may be held liable for the corrupt actions taken by employees, strategic or local partners or other representatives. If we or our intermediaries fail to comply with the requirements of the FCPA or similar legislation, governmental authorities in the U.S. and elsewhere could seek to impose civil and/or criminal fines and penalties which could have an adverse effect on our results of operations, financial condition and cash flow. To help ensure that we remain compliant with FCPA, we have proactively implemented internally and externally focused measures and controls to address this risk. We help ensure that our employees understand the key requirements of FCPA compliance and the consequences of non-compliance through training courses and detective controls. ADTRAN senior management and employees whose responsibilities include international activities are required to complete an online training program and pass an exam every two years. We have put processes in place to help detect non-compliance through providing our employees access to a worldwide reporting “hotline”, available by phone and online, that is maintained by a third-party provider. Finally, we perform annual reviews of our employees’ expense reports and corporate credit card activity to identify possible corruption concerns. We have also implemented controls to help ensure our third-party partners and customers observe FCPA requirements. Prior to selling to new international distributors, resellers or agents, we review third-party data and check them against over 200 denied party lists from government institutions worldwide for potential FCPA concerns. We also require international distributors, resellers and agents to complete an Anti-Corruption Due Diligence Questionnaire, which is reviewed and assessed by a cross-functional compliance committee and our export-compliance function.

Our operating results may be adversely affected due to uncertain global economic and financial market conditions.

The global macroeconomic environment has been challenging and inconsistent due to uncertainty in the global central bank monetary policy and uncertainty in global credit markets and the geopolitical environment in many areas of the world. In June 2016, the United Kingdom held a referendum, commonly referred to as “Brexit”, in which the majority of voters elected to withdraw from the European Union. Although the terms of withdrawal remain in negotiation, the referendum has created global economic uncertainty, including anticipation of a possible slowdown in the global economy. In addition, economic and trade and tariff challenges in China, and the global economic ramifications of these challenges, may continue to put pressure on global economic conditions. The past year has been challenging for the credit markets due to going from a time of quantitative easing to a time of quantitative tightening by central banks around the world. If global economic and market conditions, or economic conditions in key markets, remain uncertain or further deteriorate, we may experience material impacts on our business and operating results. We may also be adversely affected by Brexit, and other global economic challenges, in ways that we do not currently anticipate.

Our failure or the failure of our contract manufacturers to comply with applicable environmental regulations could adversely impact our results of operations.

The manufacture, assembly and testing of our products may require the use of hazardous materials that are subject to environmental, health and safety regulations. Our failure or the failure of our contract manufacturers to comply with any of these applicable requirements could result in regulatory penalties, legal claims or disruption of production. In

addition, our failure or the failure of our contract manufacturers to properly manage the use, transportation, emission, discharge, storage, recycling or disposal of hazardous materials could subject us to increased costs or liabilities. Existing and future environmental regulations may restrict our use of certain materials to manufacture, assemble and test products. Any of these consequences could adversely impact our results of operations by increasing our expenses and/or requiring us to alter our manufacturing processes.

If our products do not interoperate with our customers' networks, installations may be delayed or canceled, which could harm our business.

Our products must interface with existing networks, each of which may have different specifications, utilize multiple protocol standards and incorporate 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 may be required to interoperate with many or all of the products within these networks, as well as future products 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 have to modify our software or hardware to fix or overcome these errors so that our products will interoperate with the existing software and hardware. Implementation of product corrections involving interoperability issues could increase our costs and adversely affect our results of operations. Such issues may affect our ability to obtain product acceptance from other customers.

The lengthy sales and approval process required by major and other service providers for new products could result in fluctuations in our revenue.

In the industry in which we compete, sales and approval cycles are often lengthy. Selling efforts often involve a significant commitment of time and resources by us and our customers that may include extensive product testing, laboratory or network certification, or region-specific product certification and homologation requirements for deployment in networks. Additionally, a supplier must first obtain product approval from a major or other service provider to sell its products to them. This process can last from six to eighteen months, or longer, depending on the technology, the service provider, and the demand for the product from the service provider's subscribers. Consequently, we are involved in a constant process of submitting for approval succeeding generations of products, as well as products that deploy new technology or respond to new technology demands from a major or other service provider. We have been successful in the past in obtaining these approvals; however, we cannot be certain that we will obtain these approvals in the future or that sales of these products will continue to occur. Any attempt by a major or other service provider to seek out additional or alternative suppliers, or to undertake, as permitted under applicable regulations, the production of these products internally, could have a material adverse effect on our operating results. Furthermore, the delay in sales until the completion of the approval process, the length of which is difficult to predict, could result in fluctuations of revenue and uneven operating results from quarter to quarter or year to year. Further, once customer approval or certifications are met, our supply chain customers typically do not guarantee us a minimum, or any, volume of sales. We are dependent on individual purchase orders as discussed elsewhere.

We engage in research and development activities to develop new, innovative solutions and to improve the application of developed technologies, and as a consequence may miss certain market opportunities enjoyed by larger companies with substantially greater research and development efforts.

We engage in research and development activities to develop new, innovative solutions and to improve the application of developed technologies, and as a consequence may miss certain market opportunities enjoyed by larger companies with substantially greater research and development efforts. A portion of our research and development activities are focused on the continued innovation of currently accepted access technologies in order to deliver faster internet speeds, more capacity, better quality of service and operational efficiency. These research and development efforts result in improved applications of technologies for which demand already exists or is latent. We also focus our research and development efforts on developing software, solutions and platforms that enable service providers to increase revenue-generating service velocity, reduce operational costs, increase scale and provide service agility. We rarely engage in research projects that represent a vast departure from the current business practices of our key customers. While we believe our strategy provides a higher likelihood of producing nearer term or more sustainable revenue streams, this strategy could result in lost revenue opportunities should a new technology achieve rapid and widespread market acceptance. When we do engage in research and development activities for new, leading-edge technologies and market approaches, there is no guarantee that it will be successful or that it will be adopted and purchased by our customers.

We depend heavily on sales to certain customers; the loss of any of these customers would significantly reduce our revenues and net income.

Historically, a large percentage of our sales have been made to major service providers and larger independent communications companies. In 2018, these customers continued to comprise over half of our revenue. As long as the major and larger independent communications companies represent such a substantial percentage of our total sales, our future success will significantly depend upon certain factors which are not within our control, including:

- the timing and size of future purchase orders, if any, from these customers;
- changes in strategic plans and capital budgets of these customers;

- the product requirements of these customers;
- the subscriber take rate, including subscriber loss or churn, of our customers;
- the financial and operational success of these customers;
- the impact of legislative and regulatory changes on these customers;
- consolidation, acquisition of, or corporate reorganization among these customers;
- the success of these customers' services deployed using our products; and
- the impact of work stoppages at these customers.

In the past, sales to our large customers have fluctuated, and may fluctuate in the future, significantly from quarter to quarter and year to year. The loss of, or a significant reduction or delay in, sales to any such customer or the occurrence of sales fluctuations could have a material adverse effect on our business and results of operations. Further, any attempt by a major or other service provider to seek out additional or alternative suppliers or to undertake, as permitted under applicable regulations, the production of these products internally, could have a material adverse effect on our operating results.

There has been a trend toward industry consolidation in our markets for several years. We expect this trend to continue as companies attempt to strengthen or hold their market positions or are unable to continue operations. This could lead to variability in our operating results and could have a material adverse effect on our business, operating results, financial condition and cash flow. In addition, particularly in the service provider market, rapid consolidation will lead to fewer customers, with the effect that a loss of a major customer could have a material impact on our results that we would not have anticipated in a marketplace composed of more numerous participants.

If we are unable to integrate recent and future acquisitions successfully, it could adversely affect our operating results, financial condition and cash flow.

We may make acquisitions to improve or expand our product offerings, customer base, talent, or intellectual property. Our current and future acquisition strategy will depend on our ability to identify, negotiate, complete and integrate acquisitions. Acquisitions involve numerous risks, including, but not limited to:

- difficulties integrating and managing the operations, technologies and products of the companies we acquire;
- our inability to maintain the key business relationships and the brand equity of businesses we acquire;
- our inability to retain key personnel of the acquired business; and
- our responsibility for the liabilities of the businesses we acquire, including those which we may not anticipate, including costs of third-party advisors to resolve disputes.

Our strategy of outsourcing a portion of our manufacturing requirements to subcontractors located in various international regions may result in us not meeting our cost, quality or performance standards.

We are heavily dependent on subcontractors for the assembly and testing of certain printed circuit board assemblies, subassemblies, chassis, enclosures and equipment shelves, and the purchase of some raw materials used in such assemblies. This reliance involves several risks, including the unavailability of, or interruptions in, access to certain process technologies and reduced control over product quality, delivery schedules, transportation, manufacturing yields and costs. We may not be able to provide product order volumes to our subcontractors that are high enough to achieve sufficient cost savings. If shipments fall below forecasted levels, we may incur increased costs or be required to take ownership of excess inventory. Changes in international tariff structures could adversely impact our product costs. In addition, a significant component of maintaining cost competitiveness is the ability of our subcontractors to adjust their costs to compensate for possible adverse exchange rate movements. To the extent that the subcontractors are unable to do so, and we are unable to procure alternative product supplies, then our competitiveness and results of operations could be adversely impaired. These risks may be exacerbated by economic, regulatory or political changes or uncertainties, terrorist actions, the effects of climate change, natural disasters or pandemics in the foreign countries in which our subcontractors are located. We do not utilize contract manufacturing for our products in China, though we do source some ODM products from China which are, or may become, subject to import tariffs. Additionally, concerns and additional costs associated with imports tariffs imposed on certain products from China has resulted in manufacturers seeking to secure production capabilities outside of China, including in countries where we currently utilize contract manufacturing.

To date, we believe that we have successfully managed the risks of our dependence on these subcontractors through a variety of efforts, which include seeking and developing alternative subcontractors while maintaining existing relationships; however, we cannot be assured that delays in product deliveries will not occur in the future because of shortages resulting from this limited number of subcontractors or from the financial or other difficulties of these parties. Our inability to develop alternative subcontractors if and as required in the future, or the need to undertake required retraining and other activities related to establishing and developing a new subcontractor relationship, could result in delays or reductions in product shipments which, in turn, could have a negative effect on our customer relationships and operating results.

Our dependence on a limited number of suppliers for certain raw materials and key components may prevent us from delivering our products on a timely basis, which could have a material adverse effect on customer relations and operating results.

Certain raw materials and key components used in our products are currently available from only one source, and others are available from only a limited number of sources. The availability of these raw materials and supplies may be subject to market forces beyond our control, such as merger and acquisition activity of our suppliers and consolidation in some segments of our supplier base. From time to time, there may not be sufficient quantities of raw materials and supplies in the marketplace to meet customer demand. Many companies utilize the same raw materials and supplies that we do in the production of their products. Companies with more resources than our own may have a competitive advantage in obtaining raw materials and supplies due to greater buying power. These factors can result in reduced supply, higher prices of raw materials, and delays in the receipt of certain of our key components, which in turn may generate increased costs, lower margins, and delays in product delivery, with a corresponding adverse effect on revenues and customer relationships. Furthermore, due to general economic conditions in the U.S. and globally, our suppliers may experience financial difficulties, which could result in increased delays, additional costs, or loss of a supplier. We attempt to manage these risks through developing alternative sources, by staging inventories at strategic locations, through engineering efforts designed to obviate the necessity of certain components, and by building long-term relationships and close contact with each of our key suppliers; however, we cannot assure you that delays in or failures of deliveries of key components, either to us or to our contract manufacturers, and consequent delays in product deliveries, will not occur in the future.

In addition, the SEC has adopted disclosure requirements regarding the use of “conflict minerals” mined from the Democratic Republic of Congo and adjoining countries and procedures to identify the source of such minerals included in manufactured products. The disclosures will require us to incur additional costs to verify the origins of the identified minerals used and comply with disclosure requirements. These requirements could affect the availability of minerals used in the manufacture of a limited number of parts contained in our products. This may reduce the number of suppliers who provide conflict-free minerals and may affect our ability to obtain products in sufficient quantities or at competitive prices. Our material sourcing is broad-based and multi-tiered. While we are taking steps to identify sourcing based on recommended standards for our industry, we may not be able to conclusively verify the origins for all minerals used in our products. An inability to make a sourcing determination of minerals in our products could impact our revenues and harm our financial condition should our customers require that we certify that all components used in our products are free of minerals from this region.

We compete in markets that have become increasingly competitive, which may result in reduced gross profit margins and market share.

The markets for our products are intensely competitive. Additional manufacturers have entered the markets in recent years to offer products in competition with us. Additionally, certain companies have, in recent years, developed the ability to deliver competing products using coaxial cable and cellular transmission, especially in high-density metropolitan areas. Competition will further increase if new companies enter the market or existing competitors expand their product lines. Some of these potential competitors may have greater financial, technological, manufacturing, sales and marketing, and personnel resources than we have. As a result, these competitors may be able to respond more rapidly or effectively to new or emerging technologies and changes in customer requirements, withstand significant price decreases, or devote greater resources to the development, promotion, and sale of their products than we can.

In addition, our present and future competitors may be able to enter our existing or future markets with products or technologies comparable or superior to those that we offer. An increase in competition could cause us to reduce prices, decrease our market share, require increased spending by us on product development and sales and marketing, or

cause delays or cancellations in customer orders, any one of which could reduce our gross profit margins and adversely affect our business and results of operations.

Our estimates regarding future warranty obligations may change due to product failure rates, installation and shipment volumes, field service repair obligations and other rework costs incurred in correcting product failures. If our estimates change, the liability for warranty obligations may be increased or decreased, impacting future cost of goods sold.

Our products are highly complex, and we cannot ensure that our extensive product development, manufacturing and integration testing will be adequate to detect all defects, errors, failures and quality issues. Quality or performance problems for products covered under warranty could adversely impact our reputation and negatively affect our operating results, financial position and cash flow. The development and production of new products with high complexity often involves problems with software, components and manufacturing methods. If significant warranty obligations arise due to reliability or quality issues arising from defects in software, faulty components, or manufacturing methods, our operating results, financial position and cash flow could be negatively impacted by:

- costs associated with fixing software or hardware defects;
- costs associated with internal or third-party installation errors;
- high service and warranty expenses;
- costs associated with recalling and replacing products with software or hardware defects, including costs from writing-off defective products recalled;
- high inventory obsolescence expense;
- delays in collecting accounts receivable;
- payment of liquidated damages for performance failures; and
- a decline in sales to existing customers.

Managing our inventory is complex and may include write-downs of excess or obsolete inventory.

Managing our inventory of components and finished products is complicated by a number of factors, including the need to maintain a significant inventory of certain components that are in short supply, have been discontinued by the component manufacturer, that must be purchased in bulk to obtain favorable pricing or that require long lead times. These issues may result in our purchasing and maintaining significant amounts of inventory, which if not used or expected to be used based on anticipated production requirements, may become excess or obsolete. Any excess or obsolete inventory could also result in sales price reductions and/or inventory write-downs, which could adversely affect our business and results of operations.

The continuing growth of our international operations could expose us to additional risks, increase our costs and adversely affect our operating results, financial condition and cash flow.

We are expanding our presence in international markets, which represented 45.4% of our net sales for 2018, and as a result, we anticipate increased sales and operating costs in these markets. This international expansion may increase our operational risks and impact our results of operations, including:

- exposure to unfavorable commercial terms in certain countries;
- the time and cost to staff and manage foreign operations;
- the time and cost to maintain good relationships with employee associations and works councils;
- the time and cost to ensure adequate business interruption controls, processes and facilities;
- the time and cost to manage and evolve financial reporting systems, maintain effective financial disclosure controls and procedures, and comply with corporate governance requirements in multiple jurisdictions;
- the cost to collect accounts receivable and extension of collection periods;
- the cost and potential disruption of facilities transitions required in some business acquisitions;
- less regulation of patents or other safeguards of intellectual property in certain countries;
- the potential impact of adverse tax, customs regulations and transfer-pricing issues;

• exposure to increased price competition from additional competitors in some countries;
• exposure to global social, political and economic instability, changes in economic conditions, and foreign currency exchange rate movements;

- potential exposure to liability or damage of reputation resulting from a higher incidence of corruption or unethical business practices in some countries;
- potential regulations on data protection, regarding the collection, use, disclosure and security of data;
- potential trade protection measures, export compliance issues, domestic preference procurement requirements, qualification to transact business and additional regulatory requirements; and
- potential exposure to natural disasters, epidemics and acts of war or terrorism.

If we are unable to successfully address the potential risks associated with our overall international expansion, our operating results, financial condition and cash flow may be negatively impacted.

We may be adversely affected by fluctuations in currency exchange rates.

As our international sales increase or as utilization of international suppliers expands, we may transact additional business in currencies other than U.S. currency. As a result, we will be subject to the possibility of greater effects of foreign currency exchange translation on our financial statements. Sales contract commitments and accounts receivable balances based on foreign currency expose us to the potential risk of loss as the value of the U.S. dollar fluctuates over time. In addition, for those countries outside the U.S. where we have significant sales or significant purchases of supplies, devaluation in the local currency could make our products more expensive for customers to purchase or increase our costs, thereby adversely affecting our competitiveness or results of operation. When appropriate, we may enter into various derivative transactions to enhance our ability to manage the volatility relating to these typical business exposures. If used, the derivative transactions will be intended to reduce, but not eliminate, the impact of foreign currency exchange rate movements; therefore, we generally would not anticipate hedging all outstanding foreign currency risk. There can be no assurance that exchange rate fluctuations in the future will not have a material adverse effect on our revenue from international sales, manufacturing costs, results of operations, financial condition and cash flow.

Our success depends on our ability to reduce the selling prices of succeeding generations of our products.

Our strategy is to increase unit sales volumes and market share each year by introducing succeeding generations of products having lower selling prices and increased functionality as compared to prior generations of products. To maintain or increase our revenues and margins while continuing this strategy, we must continue, in some combination, to increase sales volumes of existing products, introduce and sell new products, or reduce our per unit costs at rates sufficient to compensate for the reduced revenue effect of continuing reductions in the average sales prices of our products. We cannot ensure that we will be able to maintain or increase revenues or margins by increasing unit sales volumes of our products, introducing and selling new products, or reducing unit costs of our products.

We are currently evaluating the implementation of a new enterprise resource planning (ERP) software solution. If we do not appropriately manage this project, our operations could be significantly disrupted.

We are currently evaluating the implementation of a new ERP software solution. This project could have a significant impact on our business processes, financial reporting, information systems, and internal controls, and will require significant change management, meaningful investment in capital and personnel resources, and coordination of numerous software and system providers and internal business teams. We may experience difficulties as we manage these changes and transition to a new ERP solution, including loss or corruption of data, delayed shipments, delayed financial reporting, decreases in productivity as our personnel implement and become familiar with the new systems and processes, unanticipated expenses (including increased costs of implementation, costs of conducting business or the potential impairment of previously capitalized ERP implementation costs), and lost revenues. Difficulties in implementing a new ERP solution could disrupt our operations, divert management's attention from key strategic initiatives, and have an adverse effect on our results of operations, financial condition, and cash flow.

Breaches of our information systems and cyber-attacks could compromise our intellectual property and cause significant damage to our business and reputation.

We maintain sensitive data on our information systems and the networks of third-party providers, including intellectual property, financial data and proprietary or confidential business information relating to our business, customers, suppliers, and business partners. We also produce networking equipment solutions and software used by network operators to ensure security and reliability in their management and transmission of data. Our customers, particularly those in regulated industries, are increasingly focused on the security features of our technology solutions and maintaining the security of information sensitive to us and our business partners is critical to our business and reputation. We rely upon a number of internal business processes and information systems to support key operations and financial functions, and the efficient operation of these processes and systems is critical. Companies are increasingly subjected to cyber-attacks and other attempts to gain unauthorized access. We have multiple layers of access control and devote significant resources to data encryption and other security measures to protect our information technology and communications systems. We test our vulnerability periodically and take action to further secure our networks, yet our network and storage applications and those systems and storage applications maintained by our third-party providers, may be subject to unauthorized access by cyber-attack or breached due to operator error, fraudulent activity or other system disruptions. In some cases, it is difficult to anticipate or immediately detect damage caused by such incidents. Unauthorized access or disclosure of our information could compromise our intellectual property and expose sensitive business information. Our information systems are designed to appropriate industry standards to reduce downtime in the event of power outages, weather or climate events and cyber-security issues. A significant failure of our systems due to these issues could result in significant remediation costs, disrupt business operations, and divert management attention, which could result in harm to our business reputation, operating results, financial condition and cash flow.

Our failure to maintain rights to intellectual property used in our business could adversely affect the development, functionality, and commercial value of our products.

Our future success depends in part upon our proprietary technology. Although we attempt to protect our proprietary technology by contract, trademark, copyright and patent registration, and internal security, including trade secret protection, these protections may not be adequate. Furthermore, our competitors can develop similar technology independently without violating our proprietary rights. From time to time, we receive and may continue to receive notices of claims alleging that we are infringing upon patents or other intellectual property. Any of these claims, whether with or without merit, could result in significant legal fees; divert our management's time, attention and resources; delay our product shipments; or require us to enter into royalty or licensing agreements. We cannot predict whether we will prevail in any claims or litigation over alleged infringements, or whether we will be able to license any valid and infringed patents, or other intellectual property, on commercially reasonable terms. If a claim of intellectual property infringement against us is successful and we fail to obtain a license or develop or license non-infringing technology, our business, operating results, financial condition and cash flow could be affected adversely.

Software under license from third-parties for use in certain of our products may not continue to be available to us on commercially reasonable terms.

We integrate third-party software into certain of our products. Licenses for this technology may not be available or continue to be available to us on commercially reasonable terms. Difficulties with third-party technology licensors could result in the termination of such licenses, which may result in increased costs or require us to purchase or develop a substitute technology. Difficulty obtaining and maintaining third-party technology licenses may disrupt the development of our products and increase our costs, which could harm our business.

Our use of open source software could impose limitations on our ability to commercialize our products.

Several of our solutions utilize elements of open source or publicly available software. Although we closely monitor our use of open source software, the terms of many open source software licenses have not been interpreted by the courts, and there is a risk that such licenses could be construed in a manner that could impose unanticipated conditions or restrictions on our ability to sell our products. In such event, we could be required to make our proprietary software generally available to third parties, including competitors, at no cost, to seek licenses from third-parties in order to continue offering our products, to re-engineer our products or to discontinue the sale of our products in the event re-engineering cannot be accomplished on a timely basis or at all, any of which could adversely affect our revenues and operating expenses.

We may incur liabilities or become subject to litigation that would have a material effect on our business.

In the ordinary course of business, we accept purchase orders, and enter into sales and other related contracts, for the marketing, sale, manufacture, distribution, or use of our products and services. We may incur liabilities relating to our performance under such agreements, or which result from damage claims arising from certain events as outlined within the particular contract. While we attempt to include reasonable limitations of liability and other protective measures to all agreements, such agreements may not always contain, or be subject to, maximum loss clauses, and liabilities arising from them may result in significant adverse changes to our results of operations, financial condition and cash flow.

In the ordinary course of business, we may be subject to various legal proceedings and claims, including employment disputes, patent claims, disputes over contract agreements and other commercial disputes. In some cases, claimants seek monetary recovery, or other relief, including damages such as royalty payments related to patents, lost profits, or injunctive relief, which, if granted, could require significant expenditures. Any such disputes may be resolved before trial, or if tried, may be resolved in our favor; however, the cost of claims sustained in litigation, and costs associated with the litigation process, may not be covered by our insurance. Such costs, and the demands on management time during such an event, could harm our business and have a material adverse effect on our liquidity, results of operations, financial condition and cash flow.

Consolidation and deterioration in the Competitive Local Exchange Carrier (CLEC) market could result in a significant decrease in our revenue.

We sell a moderate volume of products directly or indirectly to CLECs who compete with the established Incumbent Local Exchange Carriers (ILEC). The CLEC market is experiencing a process of consolidation. Many of our CLEC customers do not have a strong financial position and have limited ability to access the public financial markets for additional funding for growth and operations. If one or more of these CLECs fail, we could face a loss in revenue and an increased bad debt expense, due to their inability to pay outstanding invoices, as well as the corresponding decrease in customer base and future revenue. Furthermore, significant portions of our sales to CLECs are made through independent distributors. The failure of one or more CLECs could also negatively affect the financial position of a distributor to the point that the distributor could also experience business failure and/or default on payments to us.

We depend on distributors who maintain inventories of our products. If the distributors reduce their inventories of these products, our sales could be adversely affected.

We work closely with our distributors to monitor channel inventory levels and ensure that appropriate levels of product are available to resellers and end users. If our distributors reduce their levels of inventory of our products, our sales would be negatively impacted during the period of change.

If we are unable to successfully develop and maintain relationships with system integrators, service providers, and enterprise VARs, our sales may be negatively affected.

As part of our sales strategy, we are targeting system integrators (SIs), service providers and enterprise VARs. In addition to specialized technical expertise, SIs, service providers and VARs typically offer sophisticated service capabilities that are frequently desired by enterprise customers. To expand our distribution channel to include resellers with such capabilities, we must be able to provide effective support to these resellers. If our sales, marketing or service capabilities are not sufficient to provide effective support to such SIs, service providers and VARs, our sales may be negatively affected, and current SI, service provider and VAR partners may terminate their relationships with us, which would adversely impact our sales and overall results of operations.

If we fail to manage our exposure to worldwide financial and securities markets successfully, our operating results and financial statements could be materially impacted.

We are exposed to financial market risks, including changes in interest rates and prices of marketable equity and fixed-income securities. The primary objective of the majority of our investment activities is to preserve principal while at the same time achieving appropriate yields without significantly increasing risk. To achieve this objective, a majority of our marketable securities are investment grade corporate and municipal fixed-rate bonds, U.S. government bonds and municipal money market instruments denominated in U.S. dollars. While we do invest a portion of our investment portfolio in equities, which are subject to market risks, including the loss of principal, our equity investments are generally invested in professionally-managed portfolios with the objective of exceeding the performance of their underlying benchmarks. All of our fixed income and equity portfolios are reviewed regularly for performance and policy compliance. Our investment policy provides limitations for issuer concentration, which limits, at the time of purchase, the concentration in any one issuer to 5% of the market value of our total investment portfolio.

We have significant investments in corporate bonds, municipal fixed-rate bonds, asset-backed bonds, mortgage/agency-backed bonds, U.S. government bonds and foreign government bonds. Through December 31, 2018, we have not been required to impair any of these investments; however, we may experience a reduction in value or loss of liquidity in these investments, which may have an adverse effect on our results of operations, liquidity and financial condition. Fixed-rate interest securities may have their fair value adversely impacted due to a rise in interest rates, while variable-rate securities may produce less income than expected if interest rates fall. Our investments are subject to general credit, liquidity, market, and interest rate risks, which may increase because of conditions in the financial markets and related credit liquidity issues. Consequently, our future investment income may fall short of expectations due to changes in interest rates, or we may suffer losses in principal if we are forced to sell securities that decline in fair value due to changes in interest rates.

See “Management’s Discussion and Analysis of Financial Condition and Results of Operations – Liquidity and Capital Resources” in Item 7, Part II of this report, “Quantitative and Qualitative Disclosures about Market Risk” in Item 7A, Part II and Note 5 of Notes to the Consolidated Financial Statements in Item 8 of this report for more information about our investments.

New or revised tax regulations, changes in our effective tax rate, or assessments arising from tax audits may have an adverse impact on our results.

We are subject to taxation in various jurisdictions, both domestically and internationally, in which we conduct business. Significant judgment is required in the determination of our provision for income taxes and this determination requires the interpretation and application of complex and sometimes uncertain tax laws and regulations. Our effective tax rate may be adversely impacted by changes in the mix of earnings between jurisdictions with different statutory tax rates, in the valuation of our deferred tax assets, and by changes in tax rules and regulations. We continually monitor our deferred tax assets and when it becomes more likely than not that a tax benefit will not be recognized a valuation allowance is recorded against those assets. We currently receive corporate income tax credits under a program administered by the Alabama State Industrial Development Authority in connection with revenue bonds issued to provide funding for the expansion of our corporate facilities. We cannot be certain that the state of Alabama will continue to make these corporate income tax credits available; therefore, we may not realize the full benefit of these incentives, which would increase our effective tax rate. Also, employment-related tax benefits are currently accounted for in our effective tax rate. In addition, we are subject to examination of our income tax returns by the Internal Revenue Service and various other jurisdictions in which we conduct business. We regularly assess the likelihood of adverse outcomes resulting from these examinations to determine the adequacy of our provision for income taxes. There can be no assurance that the outcomes from these continuous examinations will not have an adverse effect on our results of operations, financial condition and cash flow. Additionally, the Company continually reviews the adequacy of the valuation allowance and recognizes the benefits of deferred tax assets only as the reassessment indicates that it is more likely than not that the deferred tax assets will be recognized. As such, we may release a portion of the valuation allowance or establish a new valuation allowance based on operations in the jurisdictions in which these assets arose. Management continues to evaluate all evidence including historical operating results, the existence of losses in the most recent year, forecasted earnings, future taxable income, and tax planning strategies. Should management determine a valuation allowance is needed in the future due to not being able to absorb loss carryforwards, it would have a material impact on our consolidated financial statements.

We are required to periodically evaluate the value of our long-lived assets, including the value of intangibles assets acquired and goodwill resulting from business acquisitions. Any future impairment charges required may adversely affect our operating results.

Valuation of our long-lived assets requires us to make assumptions about future sales prices and sales volumes for our products. These assumptions are used to forecast future, undiscounted cash flows. Forecasting future business trends is difficult and subject to modification. Should actual market conditions differ or our forecasts change, we may be required to reassess long-lived assets and could record an impairment charge. Any impairment charge relating to long-lived assets would have the effect of decreasing our earnings or increasing our losses in such period.

We may not fully realize the anticipated benefits of our restructuring plans. Our restructuring efforts may adversely affect our business and our operating results.

We have undertaken restructuring efforts to realign our organization to better match our market opportunities, technology development initiatives and improve efficiencies. There can be no assurance that we will fully realize the anticipated benefits to future financial results from our efforts. This realignment could adversely affect our ability to execute our business strategy by diverting management's attention from normal daily operations, decreasing cash flow and operating results due to severance payments and facility termination costs, and could be disruptive to our business. If we fail to realize some or all of the expected benefits of this realignment, it could have an adverse effect on our results of operations, financial condition and cash flow.

Our success depends on attracting and retaining key personnel.

Our business has grown significantly since its inception. Our success is dependent in large part on the continued employment of our executive officers, including Thomas R. Stanton, our Chief Executive Officer, and other key management personnel. The unplanned departure of one or more of these individuals could adversely affect our business. In addition, for ADTRAN to continue as a successful entity we must also be able to attract and retain key engineers and software developers and architects whose expertise helps us maintain competitive advantages. We believe that our future success will depend, in large part, upon our ability to continue to attract, retain, train, and motivate highly-skilled employees who are in great demand. Stock awards are designed to reward employees for their long-term contributions and to provide incentives for them to remain with us. Changes to our overall compensation program, including our stock incentive program, may adversely affect our ability to retain key employees. Properly managing our continued growth, avoiding the problems often resulting from such growth and expansion, and continuing to operate in the manner which has proven successful to us to date will be critical to the future success of our business.

Regulatory and potential physical impacts of climate change and other natural events may affect our customers and our production operations, resulting in adverse effects on our operating results.

There is a growing political and scientific consensus that emissions of greenhouse gases continue to alter the composition of the atmosphere, affecting large-scale weather patterns and the global climate. It appears that some form of U.S. federal regulation related to greenhouse gas emissions may occur, and any such regulation could result in the creation of additional costs in the form of taxes or emission allowances. The impact of any future legislation, regulations or product specification requirements on our products and business operations is dependent on the design of the final mandate or standard, so we are unable to predict its significance at this time.

The potential physical impacts of climate change and other natural events on our customers, suppliers, and on our operations are highly uncertain, and will be particular to the circumstances developing in various geographical regions. These events may include changes in weather patterns (including drought and rainfall levels), water availability, storm patterns and intensities, ocean levels, temperature levels, earthquakes and tsunamis. These potential physical effects may adversely affect our revenues, costs, production and delivery schedules, and cause harm to our results of operations, financial condition and cash flow.

While we believe our internal control over financial reporting is adequate, a failure to maintain effective internal control over financial reporting as our business expands could result in a loss of investor confidence in our financial reports and have an adverse effect on our stock price.

Section 404 of the Sarbanes-Oxley Act of 2002 requires that we assess the effectiveness of our internal control over financial reporting as of the end of our fiscal year, and issue a report that states whether or not such internal control is

effective. Compliance with these requirements requires significant cost and the commitment of time and staff resources. Expansion of our business, particularly in international geographies, necessitates ongoing changes to our internal control systems, processes and information systems. We cannot be certain that as this expansion occurs, our current design for internal control over financial reporting will be sufficient to enable management or our independent registered public accounting firm to determine that our internal control is effective for any period, or on an ongoing basis. If we or our independent registered public accounting firm are unable to assert that our internal control over financial reporting is effective, we could lose investor confidence in the accuracy and completeness of our financial statements, which could have an adverse effect on our stock price.

The price of our common stock has been volatile and may continue to fluctuate significantly.

Our common stock is traded on the NASDAQ Global Select Market under the symbol ADTN. Since our initial public offering in August 1994, there has been, and may continue to be, significant volatility in the market for our common stock, based on a variety of factors, including factors listed in this section, some of which are beyond our control.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our headquarters and principal administrative, engineering and manufacturing facilities are located on an 82-acre campus in Cummings Research Park in Huntsville, Alabama. Two office buildings serve both our Network Solutions and our Services & Support segments. We lease engineering facilities in Europe and India that are used to develop products sold by our Network Solutions segment.

In addition, we lease office space in North America, Latin America, EMEA and the Asia-Pacific region, providing sales and service support for both of our segments.

These cancelable and non-cancelable leases expire at various times through 2025. For more information, see Note 15 of the Notes to Consolidated Financial Statements included in Item 8 of this report.

We also have numerous sales and support staff operating from home-based offices serving both our Network Solutions and our Services & Support segments, which are located within the United States and abroad.

ITEM 3. LEGAL PROCEEDINGS

We have been involved from time to time in litigation in the normal course of our business. We are not aware of any pending or threatened litigation matters that could have a material adverse effect on the Company's consolidated financial statements, results of operations or liquidity.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

ITEM 4A. EXECUTIVE OFFICERS OF THE REGISTRANT

Set forth below, in accordance with General Instruction G(3) of Form 10-K and Instruction 3 of Item 401(b) of Regulation S-K, is certain information regarding the executive officers of ADTRAN. Unless otherwise indicated, the information set forth is as of December 31, 2018.

Thomas R. Stanton Age 54
2007 to present Chief Executive Officer and Chairman of the Board

Roger D. Shannon Age 53
2015 to present Senior Vice President of Finance, Chief Financial Officer, Corporate Secretary and Treasurer
2006 – 2015 Chief Financial Officer and Treasurer – Steel Technologies LLC

Michael K. Foliano Age 58
2006 to present Senior Vice President of Operations

Raymond Harris Age 55
2018 to present Chief Information Officer
2017 – 2018 Director High-Performance Computing – Johns Hopkins University Applied Physics Lab
2010 – 2017 Vice President and Chief Information Officer – Iron Bow Technologies LLC
2008 – 2010 Chief Information Security Engineer – Johns Hopkins University Applied Physics Lab

John Neville Age 59
2018 to present Senior Vice President, Sales
2016 – 2018 Head of Strategic Planning and Business Development
2009 – 2016 Executive Vice President of North America – Ericsson, Inc.

Eduard Scheiterer Age 65
2015 to present Senior Vice President, Research and Development
2014 – 2015 Senior Vice President and Managing Director, International Markets
2012 – 2014 Managing Director – Adtran GmbH, a German wholly owned subsidiary of Adtran, Inc.
2009 – 2012 Head of Broadband Access – Nokia (formerly Nokia Siemens Networks), Germany

James D. Wilson, Jr. Age 48
2015 to present Senior Vice President of Technology and Strategy
2006 – 2015 Senior Vice President and General Manager, Carrier Networks

There are no family relationships among our directors or executive officers.

PART II

**ITEM MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND
5. ISSUER PURCHASES OF EQUITY SECURITIES**

ADTRAN's common stock is traded on the NASDAQ Global Select Market under the symbol ADTN. As of February 7, 2019, ADTRAN had 166 stockholders of record and approximately 7,019 beneficial owners of shares held in street name. The following table shows the high and low closing prices per share for our common stock as reported by NASDAQ for the periods indicated.

Common Stock Prices

	High	Low
2018		
First Quarter	\$20.00	\$15.35
Second Quarter	\$16.05	\$13.95
Third Quarter	\$18.80	\$14.95
Fourth Quarter	\$18.12	\$10.43
2017		
First Quarter	\$23.20	\$20.75
Second Quarter	\$20.65	\$19.10
Third Quarter	\$24.00	\$20.05
Fourth Quarter	\$24.50	\$19.35

The following table shows the shareholder dividends paid in each quarter of 2018 and 2017. The Board of Directors presently anticipates that it will declare a regular quarterly dividend so long as the present tax treatment of dividends exists and adequate levels of liquidity are maintained.

Dividends per Common Share

	2018	2017
First Quarter	\$0.09	\$0.09
Second Quarter	\$0.09	\$0.09
Third Quarter	\$0.09	\$0.09
Fourth Quarter	\$0.09	\$0.09

Stock Repurchases

The following table sets forth repurchases of our common stock for the months indicated.

<u>Period</u>	Total	Average	Total Number of Shares	Maximum Number of
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	Number of Shares Purchased	Price Paid per Share	Purchased as Part of Publicly Announced Plans or Programs ⁽¹⁾	Shares that May Yet Be Purchased Under the Plans or Programs
October 1, 2018 – October 31, 2018	50,000	\$ 13.60	50,000	2,608,516
November 1, 2018 – November 30, 2018	50,000	\$ 13.33	50,000	2,558,516
December 1, 2018 – December 31, 2018	—	\$ —	—	2,558,516
Total	100,000		100,000	

⁽¹⁾Since 1997, our Board of Directors has approved multiple share repurchase programs that have authorized open market repurchase transactions of our common stock, which are implemented through open market or private purchases from time to time as conditions warrant. We currently have authorization to repurchase an additional 2.6 million shares of our common stock under the current authorization of up to 5.0 million shares.

ITEM 6. SELECTED FINANCIAL DATA

Income Statement Data

(In thousands, except per share amounts)

Year Ended December 31,	2018	2017	2016	2015	2014
Sales	\$529,277	\$666,900	\$636,781	\$600,064	\$630,007
Cost of sales ⁽¹⁾	325,712	363,265	345,451	333,166	318,704
Gross Profit	203,565	303,635	291,330	266,898	311,303
Selling, general and administrative expenses ⁽¹⁾	124,440	135,583	131,848	123,540	131,999
Research and development expenses ⁽¹⁾	124,547	130,666	124,909	129,868	132,443
Operating Income (Loss)	(45,422)	37,386	34,573	13,490	46,861
Interest and dividend income	4,026	4,380	3,918	3,953	5,019
Interest expense	(533)	(556)	(572)	(596)	(677)
Net investment gain (loss)	(4,050)	4,685	5,923	10,337	7,278
Other income (expense), net ⁽¹⁾	1,286	(1,208)	(489)	(1,476)	1,425
Gain on bargain purchase of a business	11,322	—	3,542	—	—
Income (Loss) Before (Provision) Benefit for Income Taxes	(33,371)	44,687	46,895	25,708	59,906
(Provision) benefit for income taxes	14,029	(20,847) ⁽²⁾	(11,666)	(7,062)	(15,286)
Net Income (Loss)	\$(19,342)	\$23,840	\$35,229	\$18,646	\$44,620

Weighted average shares outstanding – basic	47,880	48,153	48,724	51,145	55,120
Weighted average shares outstanding – assuming dilution ⁽³⁾	47,880	48,699	48,949	51,267	55,482
Earnings (loss) per common share – basic	\$(0.40)	\$0.50	\$0.72	\$0.36	\$0.81
Earnings (loss) per common share – assuming dilution ⁽³⁾	\$(0.40)	\$0.49	\$0.72	\$0.36	\$0.80
Dividends declared and paid per common share	\$0.36	\$0.36	\$0.36	\$0.36	\$0.36

Balance Sheet Data

(In thousands)

At December 31,	2018	2017	2016	2015	2014
Working capital ⁽⁴⁾	\$237,416	\$306,296	\$226,367	\$219,219	\$214,985
Total assets	\$628,027	\$669,094	\$667,235	\$632,904	\$738,694
Total debt	\$25,600	\$26,700	\$27,800	\$28,900	\$30,000
Stockholders' equity	\$446,279	\$497,911	\$479,517	\$480,160	\$549,013

⁽¹⁾ On January 1, 2018, we adopted ASU 2017-07, Compensation – Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. We retrospectively adopted the presentation of service cost separate from other components of net periodic pension costs. As a result, \$0.4 million, \$0.2 million, (\$11,000) and \$0.3 million have been reclassified from cost of sales, selling, general and administrative expenses, and research and development expense to other income (expense), net for the years ended December 31, 2017, 2016, 2015 and 2014, respectively. See Note 1 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

⁽²⁾ Provision for income taxes in 2017 reflected an estimated expense of \$11.9 million related to the Tax Cuts and Jobs Act, which was signed into law on December 22, 2017. See Note 12 of Notes to Consolidated Financial Statements, included in Item 8 of this report, for additional information.

- ⁽³⁾ Assumes exercise of dilutive stock options calculated under the treasury method. See Notes 1 and 16 of Notes to Consolidated Financial Statements, included in Item 8 of this report. As a result of the net loss for the year ended December 31, 2018, we excluded 0.1 million of unvested stock options, PSU's, RSU's and restricted stock from the calculation of diluted EPS due to their anti-dilutive effect.
- ⁽⁴⁾ Working capital consists of current assets less current liabilities. Amounts prior to 2016 have been recast to conform to the current period's presentation as a result of our adoption of Accounting Standards Update 2015-17, Balance Sheet Classification of Deferred Taxes. See Note 1 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

Overview

ADTRAN is a leading global provider of networking and communications equipment, serving a diverse domestic and international customer base in 68 countries that includes Tier 1, 2 and 3 service providers, cable/MSOs and distributed enterprises. Our innovative solutions and services enable voice, data, video and internet communications across a variety of network infrastructures and are currently in use by millions of users worldwide. We support our customers through our direct global sales organization and our distribution networks. Our success depends upon our ability to increase unit volume and market share through the introduction of new products and succeeding generations of products having lower selling prices and increased functionality as compared to both the prior generation of a product and to the products of competitors. In order to service our customers and build revenue, we are constantly conducting research and development of new products addressing customer needs and testing those products for the particular specifications of the particular customers. In addition to our corporate headquarters in Huntsville, Alabama, we have research and development (R&D) facilities in strategic global locations.

We are focused on being a top global supplier of access infrastructure and related value-added solutions from the cloud edge to the subscriber edge. We offer a broad portfolio of flexible software and hardware network solutions and services that enable service providers to meet today's service demands, while enabling them to transition to the fully converged, scalable, highly automated, cloud-controlled voice, data, internet and video network of the future.

Our success depends upon our ability to increase unit volume and market share through the introduction of new products and succeeding generations of products having lower selling prices and increased functionality as compared to both the prior generation of a product and to the products of competitors. An important part of our strategy is to reduce the cost of each succeeding product generation and then lower the product's selling price based on the cost savings achieved in order to gain market share and/or improve gross margins. As a part of this strategy, we seek to be a high-quality, and in most instances the low-cost provider of products in our markets. Our success to date is attributable in large measure to our ability to design our products initially with a view to their subsequent redesign, allowing both increased functionality and reduced manufacturing costs in each succeeding product generation. This strategy enables us to sell succeeding generations of products to existing customers, while increasing our market share by selling these enhanced products to new customers.

Our business is global. We supply different sets of products to different customers in different regions around the world. Our financial results in any period reflect the activities of our various customers in their respective regions at any given time. In order to service our customers and build revenue, we are constantly conducting research and development of new products addressing customer needs and testing those products for the particular specifications of the particular customers. The lead times to revenues for these products vary.

we acquired the market-leading EPON business and certain assets for North America from Sumitomo

For more information, see Note 2 of the Notes to Consolidated Financial Statements included in Item 8 of this report.

As previously reported, we experienced a significant negative impact on our North American revenue as a result of a decision in mid-fourth quarter 2017 by a major customer to suspend a product rollout and network upgrade following a merger. While we continue to sell to that customer, the project in question has not yet resumed to prior levels, and we are unsure when, if ever, it will. During the periods covered in this report, our North American revenue was also impacted by slower-than-expected orders of an ultra-broadband product by a large domestic customer.

During the same period, however, we have seen an expansion of our revenues from much of the customer base and have brought to fruition our participation in a number of large customer projects, which in some cases have begun to produce some revenues and in all cases represent a possibility of significant revenue in the future. These include next-generation PON projects with service providers, both domestically and internationally, the deployment for a large project in the APAC region, a significant network upgrade by a Tier 1 European customer, as well as continued expansion and opportunities for our EPON products to two of the top North American cable/MSO operators.

While our services business did not increase at the rate that it did in 2016 and 2017, and has decreased from the record levels we achieved in 2017 due to the above-mentioned merger-related disruption, we continue to develop our services business around the world, and we anticipate that it will continue to expand and remain an increasingly important part of our revenue streams across the world. Margins on services revenue vary depending upon the types of services performed.

We review our financial performance, specifically revenue and gross profit, based on two reportable segments – Network Solutions and Services & Support. Network Solutions software and hardware products provide solutions supporting fiber-, copper- and coaxial-based infrastructures and a growing number of wireless solutions, lowering the overall cost to deploy advanced services across a wide range of applications for Carrier, Cable/MSO networks and business networks, as well as prior-generation products. Our Services & Support enables our customers to accelerate time to market, reduce costs and improve customer satisfaction through a complete portfolio of services, including maintenance, turnkey network implementation, solutions integration, and managed services. ADTRAN's comprehensive network implementation services include engineering design and documentation (pre-construction), construction and installation (construction), and test, turn-up and provisioning (post-construction). Additionally, we partner with customers to tailor a program to each specific service-delivery need.

In addition, we also report revenue for the following three categories – Access & Aggregation, Subscriber Solutions & Experience (formerly Customer Devices) and Traditional & Other Products.

Access & Aggregation solutions are used by service providers to connect their network infrastructure to subscribers. This category includes software- and hardware-based products and services that aggregate and/or originate access technologies. The portfolio of ADTRAN solutions within this category includes a wide array of modular or fixed physical form factors designed to deliver the best technology and economic fit based on the target subscriber density and environmental conditions.

The Access & Aggregation category includes product and service families such as:

- Mosaic-branded network management and subscriber services control and orchestration software within SD-Access architectures;
- SDX series of SDN-controlled programmable network elements that form the hardware components within SD-Access architectures;
- Total Access 5000 Series Fiber to the Premises (FTTP) and Fiber to the Node (FTTN) Multi-Service Access Nodes (MSAN);
- hiX 5600 Series fiber aggregation and FTTN MSAN;
- Fiber to the Distribution Point (FTTdp) Gfast Distribution Point Units (DPUs);
- GPON, EPON and 10G PON Optical Line Terminals (OLTs);
- Optical Networking Edge (ONE) aggregation;
- IP-based Digital Subscriber Line Access Multiplexers (DSLAMs);
- Cabinet and Outside-Plant (OSP) enclosures and services;
- Pluggable optical transceivers (i.e., SFP, SFP+, XFP, QSFP), cables and other miscellaneous materials;

Planning, engineering, program management, maintenance, installation and commissioning services to implement customer network solutions;

Other products and services that are generally applicable to Access & Aggregation.

Subscriber Solutions & Experience (formerly Customer Devices) includes open-source connected home platforms, cloud services and any of our solutions and services that deliver residential and/or enterprise subscribers an immersive and interactive broadband experience from the service provider's access network. These products, software, and services include SmartRG solutions and applications, NetVanta Enterprise IP business gateways, access routers, Ethernet switches, ProCloud service offerings, residential and enterprise operating systems (such as SmartOS and AOS), Bluesocket Wi-Fi portfolio, service provider and Cable/MSO Optical Network Terminals (ONTs), as well as related software applications and services. In alignment with our increased focus on enhancing customer experience for both business and consumer broadband customers as well as the addition of SmartRG during 2018, Customer Devices will now be known as Subscriber Solutions & Experience, as this more accurately represents this revenue category and our vision moving forward.

The Subscriber Solutions & Experience category includes products and services such as:

- Cloud-based SaaS management platforms for service providers to manage residential and enterprise networks;
- SaaS platforms for subscriber and network analytics collection used to enhance network operations and customer experience;
- SmartOS-branded embedded software licensing for residential and enterprise gateway and Wi-Fi devices;
- Broadband customer premises solutions, including GPON, XGS-PON, NG-PON2, EPON and 10G EPON and point-to-point Ethernet Optical Network Terminals (ONTs);
- Radio Frequency over Glass (RFoG) MicroNodes;
- Wi-Fi enabled residential gateway products and accessories across xDSL, Ethernet, DOCSIS, LTE, and fiber technologies;
- Enterprise Wi-Fi access points and associated powering and switching infrastructure;
- Enterprise Session Border Controller (eSBC) device platforms and software;
- Branch office business routers;
- Carrier Ethernet services termination devices;
- Voice over Internet Protocol (VoIP) media gateways;
- ProServices pre-sale and post-sale technical support;
- Planning, engineering, program management, maintenance, installation and commissioning services to implement customer devices solutions into consumer, small business and enterprise locations;
- Other products, software and services applicable to subscriber solutions and experience.

Traditional & Other Products generally includes a mix of prior-generation technologies' products and services, as well as other products and services that do not fit within the Access & Aggregation or Subscriber Solutions & Experience categories.

The Traditional & Other Products category includes products and services such as:

- Time Division Multiplexed (TDM) and Asynchronous Transfer Mode (ATM)-based aggregation systems and customer devices;
-

HDSL, ADSL and other mature technologies used to deliver business and residential services over service provider access and customer networks;

• Other products and services outside the Access & Aggregation and Subscriber Solutions & Experience categories.

Our operating results have fluctuated on a quarterly basis in the past, and may vary significantly in future periods due to a number of factors, including customer order activity and backlog. A substantial portion of our shipments in any fiscal period relates to orders received and shipped within that fiscal period for customers under agreements containing non-binding purchase commitments. Further, a significant percentage of orders require delivery within a few days. These factors normally result in very little order backlog or order flow visibility. Additionally, backlog levels may vary because of seasonal trends, the timing of customer projects, and other factors that affect customer order lead times. Because many of our customers require prompt delivery of products, we are required to maintain sufficient inventory levels to satisfy anticipated customer demand. If near-term demand for our products declines, or if potential sales in any quarter do not occur as anticipated, our financial results could be adversely affected. Operating expenses are relatively fixed in the short term; therefore, a shortfall in quarterly revenues could significantly impact our financial results in a given quarter.

Our operating results may also fluctuate as a result of a number of other factors, including a decline in general economic and market conditions, foreign currency exchange rate movements, increased competition, customer order patterns, changes in product and services mix, timing differences between price decreases and product cost reductions, product warranty returns, expediting costs, tariffs and announcements of new products by us or our competitors. Additionally, maintaining sufficient inventory levels to assure prompt delivery of our products increases the amount of inventory that may become obsolete and increases the risk that the obsolescence of this inventory may have an adverse effect on our business and operating results. Also, not maintaining sufficient inventory levels to assure prompt delivery of our products may cause us to incur expediting costs to meet customer delivery requirements, which may negatively impact our operating results in a given quarter.

Accordingly, our historical financial performance is not necessarily a meaningful indicator of future results, and, in general, management expects that our financial results may vary from period to period. See Note 17 of Notes to Consolidated Financial Statements, included in Item 8 of this report, for additional information. For a discussion of risks associated with our operating results, see Item 1A of this report.

Results of Operations

The following table presents selected financial information derived from our consolidated statements of income expressed as a percentage of sales for the years indicated. Amounts may not foot due to rounding.

<u>Year Ended December 31,</u>	2018	2017	2016
Sales			
Products	86.6 %	81.0 %	82.5 %
Services	13.4	19.0	17.5
Total sales	100.0	100.0	100.0
Cost of sales			
Products	52.7	41.9	42.5
Services	8.8	12.6	11.7
Total cost of sales	61.5	54.5	54.2
Gross profit	38.5	45.5	45.8
Selling, general and administrative expenses	23.5	20.3	20.7
Research and development expenses	23.5	19.6	19.6
Operating income (loss)	(8.6)	5.6	5.4
Interest and dividend income	0.8	0.7	0.6
Interest expense	(0.1)	(0.1)	(0.1)
Net investment gain (loss)	(0.8)	0.7	0.9
Other income (expense), net	0.2	(0.2)	(0.1)
Gain on bargain purchase of a business	2.1	—	0.6
Income (loss) before (provision) benefit for income taxes	(6.3)	6.7	7.4
(Provision) benefit for income taxes	2.7	(3.1)	(1.8)
Net income (loss)	(3.7)%	3.6 %	5.5 %

2018 Compared to 2017

Sales

Our sales decreased 20.6% from \$666.9 million for the year ended December 31, 2017 to \$529.3 million for the year ended December 31, 2018. The decrease in sales occurred over both our Network Solutions and our Services & Support reporting segments. Our Network Solutions sales decreased \$82.2 million compared to 2017, and our Services & Support sales decreased \$55.5 million versus the prior year. The decrease in our 2018 sales is primarily attributable to the termination of a multi-city broadband project, resulting from a merger-related review and slowdown in spending at a domestic Tier 1 customer that particularly affected our Access & Aggregation products and services, which decreased \$115.1 million in 2018. The 2018 decline in sales to this domestic Tier 1 customer was partially offset by an increase in international sales of \$81.7 million during the year, primarily as a result of increased sales to Tier 1 customers in the EMEA and Asia-Pacific regions. During 2018, sales of our Subscriber Solutions & Experience products decreased \$4.0 million, due primarily to decreases in sales of our fiber CPE, and sales of our Traditional & Other Products decreased \$18.6 million.

Network Solutions segment sales decreased by 15.2% from \$540.4 million in 2017 to \$458.2 million in 2018, due primarily to a decrease in our Access & Aggregation products. The decrease in sales of 16.6% of our Access & Aggregation products for 2018 is primarily attributable to the above-mentioned merger-related review and slowdown in spending at a domestic Tier 1 customer, partially offset by an increase in sales to international Tier 1 customers as discussed further below. The decrease of 2.9% in 2018 for sales of our Subscriber Solutions & Experience products is primarily attributable to the changes in sales of fiber CPE products. While we expect that revenues from Traditional & Other Products will continue to decline over time, these revenues may fluctuate and continue for years because of the time required for our customers to transition to newer technologies.

Services & Support sales decreased by 43.8% from \$126.5 million in 2017 to \$71.0 million in 2018. The decrease in sales for 2018 is primarily attributable to a significant decrease in network installation services for Access & Aggregation products related to the above mentioned merger-related review and slowdown in spending at a domestic Tier 1 customer.

Domestic sales decreased 43.2% from \$508.2 million in 2017 to \$288.8 million in 2018 which was a result of a decision in the mid-fourth quarter 2017 by a major customer to suspend a product rollout and network upgrade following a major. Excluding the impact of this customer, domestic sales increased by 9.1% in 2018 over the prior year.

International sales, which are included in the Network Solutions and Services & Support amounts discussed above, increased 51.5% from \$158.7 million in 2017 to \$240.4 million in 2018. International sales as a percentage of total sales increased from 23.8% in 2017 to 45.4% in 2018. The increase in sales for 2018 is primarily attributable to an increase in sales in EMEA and APAC. The increase in sales for 2018 in EMEA is primarily attributable to a network expansion program and a services award by a large European Tier 1 customer. The increase in sales in APAC for 2018 is primarily attributable to a network expansion program by a Tier 1 customer in Australia.

Our international revenues are largely focused on broadband infrastructure and are impacted by the decisions of our customers as to the timing for installation of new technologies, expansion of their networks and/or network upgrades. Our international customers must make these decisions in the regulatory and political environment in which they operate – both nationally and in some instances, regionally – whether of a multi-country region or a more local region within a country. For example, the European Commission launched a Gigabit Society initiative, and before that, the Digital Agenda, which has provided a favorable market environment for the deployment of ultra-broadband and Gigabit network solutions. Although the overall environment and market demand for broadband service deployment in the European Union have improved, some new broadband technologies are still being reviewed for regulatory and standards compliance, which may affect the timing of those technologies. In Mexico, regulatory changes have created uncertainty for customers resulting in slowdowns in their network buying patterns, which are only now beginning to be resolved. The competitive landscape in certain international markets is also impacted by the increased presence of Asian manufacturers that seek to compete aggressively on price. A strengthening U.S. dollar can also negatively impact our revenues in regions such as Latin America, where our products are traditionally priced in U.S. dollars, while in regions where our products are sold in local currency, such as Europe, a stronger U.S. dollar can negatively impact operating income. Consequently, while we expect the global trend towards deployment of more robust broadband speeds and access to continue creating additional market opportunities for us, the factors described above may result in pressure on revenues and operating income. However, we do not presently foresee a significant negative impact on our financial condition based on our strong liquidity and the generally positive environment described above.

We recognized a positive revenue impact in the first half of 2017 due to our being awarded a network expansion program by a large European Tier 1 customer. During 2018, this European Tier 1 customer undertook an additional network expansion project. Additionally, we anticipate that as our Latin American customers resume their network

upgrade projects, we may experience further enhancement to our revenues. As announced, we received of a new nationwide award in the APAC region, as well as additional awards based on new ADTRAN technologies in the EMEA region that have, and we believe will continue to have, a positive impact to our revenues.

Cost of Sales

As a percentage of sales, cost of sales increased from 54.5% for the year ended December 31, 2017 to 61.5% for the year ended December 31, 2018. The increase in the cost of sales as a percentage of sales is due primarily to regional revenue shifts, customer and product mix, services and support mix, restructuring expenses and an increase in warranty expense.

Network Solutions cost of sales, as a percent of that segment's sales, increased from 51.7% of sales in 2017 to 60.9% of sales in 2018. The increase in Network Solutions cost of sales as a percentage of that segment's sales is primarily attributable to a regional revenue shift, customer and product mix, an increase in warranty expense from the prior year due to a settlement received in first quarter of 2017 from a third-party supplier for a defective component, higher product costs versus the prior year due to purchase discounts received from a contract manufacturer in the first quarter of 2017 and an increase in restructuring expenses incurred during 2018.

An important part of our strategy is to reduce the product cost of each succeeding product generation and then to lower the product's price based on the cost savings achieved. This may cause variations in our gross profit percentage due to timing differences between the recognition of cost reductions and the lowering of product selling prices.

Services & Support cost of sales, as a percent of that segment's sales, decreased from 66.2% of sales in 2017 to 65.8% of sales in 2018. The decrease in Services & Support cost of sales as a percentage of that segment's sales in 2018 is primarily attributable to customer mix, services and support mix, and certain cost reductions from restructuring related to the realignment of our Services & Support labor expense resulting from the above-mentioned merger-related termination of a network upgrade project by a domestic Tier 1 customer.

Our Services & Support revenues are comprised of network planning and implementation, maintenance, support and cloud-based management services, with network planning and implementation being the largest and fastest growing component. Our services business has experienced significant growth since 2015 as competitive pressures to expand broadband access and speeds have strained carriers' ability to respond to customer demand. However, the revenue associated with this business decreased from 2017 to 2018 due to the impact of the above-mentioned merger-related review and slowdown of a network upgrade project by a domestic Tier 1 customer. Compared to our other services, such as maintenance, support and cloud-based management services, our network planning and implementation services typically utilize a higher percentage of internal and sub-contracted engineers, professionals and contractors to perform the work for customers. The additional costs incurred to perform these infrastructure and labor-intensive services inherently result in lower average gross margins as compared to maintenance and support services.

As our network planning and implementation revenues have grown and are now the largest component of our Services & Support business, our Services & Support segment gross margins decreased versus those reported when maintenance and support comprised the majority of the business. Further, because the growth in our network planning and implementation services has resulted in our Services & Support revenues comprising a larger percentage of our overall revenues, and because our Services & Support gross margins are below those of the Network Solutions segment, our overall corporate gross margins have declined as that business has continued to grow. Within the Services & Support segment, we do expect variability in gross margins from quarter-to-quarter based on the mix of the services recognized.

Selling, General and Administrative Expenses

Selling, general and administrative expenses decreased by 8.2% from \$135.6 million in 2017 to \$124.4 million in 2018. Selling, general and administrative expenses include personnel costs for administration, finance, information technology, human resources, sales and marketing, and general management, as well as rent, utilities, legal and accounting expenses, advertising, promotional material, trade show expenses, and related travel costs. The decrease in selling, general and administrative expenses is primarily attributable to a decrease in compensation and labor expense, independent contractor expense, and travel expense, partially offset by an increase in restructuring expenses.

Selling, general and administrative expenses as a percentage of sales increased from 20.3% for the year ended December 31, 2017 to 23.5% for the year ended December 31, 2018. Selling, general and administrative expenses as a percentage of sales will generally fluctuate whenever there is a significant fluctuation in revenues for the periods being compared as these costs are relatively fixed in the short term.

Research and Development Expenses

Research and development expenses decreased by 4.7% from \$130.7 million for the year ended December 31, 2017 to \$124.5 million for the year ended December 31, 2018. The decrease in research and development expenses is primarily attributable to a decrease in compensation and labor expense, independent contractor expense, and travel expense, partially offset by an increase in restructuring expenses.

Research and development expenses as a percentage of sales increased from 19.6% for the year ended December 31, 2017 to 23.5% for the year ended December 31, 2018. Research and development expenses as a percentage of sales will fluctuate whenever there are incremental product development activities or significant fluctuations in revenues for the periods being compared.

We expect to continue to incur research and development expenses in connection with our new and existing products and our expansion into international markets. We continually evaluate new product and market opportunities and engage in significant research and development efforts which provide for new product development, enhancement of existing products and product cost reductions. We may incur significant research and development expenses prior to the receipt of revenues from a major new product group.

Interest and Dividend Income

Interest and dividend income decreased by 8.1% from \$4.4 million for the year ended December 31, 2017 to \$4.0 million for the year ended December 31, 2018. The decrease in interest and dividend income is primarily attributable to fluctuations in investment balances.

Interest Expense

Interest expense, which is primarily related to our taxable revenue bond, decreased by 4.1% from \$0.6 million for the year ended December 31, 2017 to \$0.5 million for the year ended December 31, 2018 as a result of a principal payment made on our taxable revenue bond during the year ended December 31, 2018. See “Financing Activities” in “Liquidity and Capital Resources” below for additional information on our taxable revenue bond.

Net Investment Gain (Loss)

Net investment gain (loss) reversed from a gain of \$4.7 million for the year ended December 31, 2017 to a loss of \$4.0 million for the year ended December 31, 2018. The decrease is primarily attributable to changes in fair value on equity securities recognized during the period under ASC 2016-01. Prior to January 1, 2018, changes in fair value were recognized in accumulated other comprehensive income, net of deferred taxes, on the balance sheet. With the adoption of ASC 2016-01 in January 2018, unrealized gains or losses are now recognized in other income in the period they are incurred. The loss in 2018 is a result of unrealized losses in our professionally-managed equity investment portfolios resulting from extreme equity market volatility in the fourth quarter of 2018. We expect that any future equity market volatility will result in continued volatility in gains or losses from our equity investment portfolios. See “Investing Activities” in “Liquidity and Capital Resources” and Note 1 and Note 5 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Other Income (Expense), net

Other income (expense), net, which is comprised primarily of gains and losses on foreign currency transactions, gains and losses on foreign exchange forward contracts, investment account management fees, and miscellaneous income and expense, increased 206.5% from expense of \$1.2 million for the year ended December 31, 2017 to income of \$1.3 million for the year ended December 31, 2018. The change is primarily attributable to losses on foreign exchange contracts and transactions in 2017 as compared to foreign exchange gains in 2018.

Gain on Bargain Purchase of a Business

Gain on bargain purchase of a business is related to our acquisition of Sumitomo Electric Lightwave Corp.’s North American EPON business and entry into a technology license and supply agreement with Sumitomo Electric Industries, Ltd. on March 19, 2018. See Note 2 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

(Provision) Benefit for Income Taxes

Our effective tax rate decreased from an expense of 46.7% for the year ended December 31, 2017 to a benefit of 42.0%, excluding the tax effect of the bargain purchase gain, for the year ended December 31, 2018. The decrease in the effective tax rate between the two periods was primarily driven by the current year losses in our domestic business and the expense recognized in 2017 related to the effect of the U.S. Tax Cuts and Jobs Act, which was signed into law on December 22, 2017. As a result of the 2017 tax law change, an expense of \$11.9 million was recorded in the fourth quarter of 2017, of which \$9.2 million related to the write-down of deferred tax assets and \$2.7 million related to tax on unrepatriated foreign earnings. Additional work to complete a more detailed analysis of historical foreign earnings, as well as the full impact to the write-down of deferred tax assets, was completed in the third quarter of 2018 and resulted in a tax benefit of \$4.0 million. See Note 12 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Net Income (Loss)

As a result of the above factors, net income (loss) decreased from income of \$23.8 million for the year ended December 31, 2017 to a loss of \$(19.3) million for the year ended December 31, 2018. As a percentage of sales, net income (loss) decreased from 3.6% for the year ended December 31, 2017 to (3.7%) for the year ended December 31, 2018.

2017 Compared to 2016

Sales

Our sales increased by 4.7% from \$636.8 million in 2016 to \$666.9 million in 2017. The increase in sales occurred over both our Network Solutions and our Services & Support reporting segments. Our Network Solutions sales increased \$14.9 million in 2017, and our Services & Support sales increased \$15.2 million compared to the prior year.

Network Solutions sales increased by 2.8% from \$525.5 million in 2016 to \$540.4 million in 2017. The increase in sales in 2017 is primarily attributable to an increase in sales of our Access & Aggregation products, partially offset by a decrease in sales of our Traditional & Other products. The increase in sales of our Access & Aggregation products is primarily attributable to increased VDSL2 vectoring product sales in the U.S. and European carrier markets. While we expect that revenues from Traditional & Other products will continue to decline over time, these revenues may fluctuate and continue for years because of the time required for our customers to transition to newer technologies.

Services & Support sales increased by 13.7% from \$111.3 million in 2016 to \$126.5 million in 2017. The increase in sales in 2017 is primarily attributable to an increase in network installation services for Access & Aggregation products.

International sales, which are included in the Network Solutions and Services & Support amounts discussed above, increased 17.2% from \$135.4 million in 2016 to \$158.7 million in 2017. International sales, as a percentage of total sales, increased from 21.3% in 2016 to 23.8% in 2017. The increase in international sales in 2017 is primarily attributable to an increase in sales in EMEA, partially offset by a decrease in sales in Latin America and the APAC region.

Cost of Sales

As a percentage of sales, cost of sales increased from 54.2% in 2016 to 54.5% in 2017. The increase is primarily attributable to a regional revenue shift, customer and product mix and services and support mix.

Network Solutions cost of sales, as a percent of that segment's sales, increased from 51.5% of sales in 2016 to 51.7% of sales in 2017. The increase in Network Solutions cost of sales as a percentage of that segment's sales is primarily attributable to customer and product mix.

An important part of our strategy is to reduce the product cost of each succeeding product generation and then to lower the product's price based on the cost savings achieved. This may cause variations in our gross profit percentage due to timing differences between the recognition of cost reductions and the lowering of product selling prices.

Services & Support cost of sales, as a percent of that segment's sales, decreased from 67.2% of sales in 2016 to 66.2% of sales in 2017. The decrease in Services & Support cost of sales as a percentage of that segment's sales is primarily attributable to the mix of network installation programs and support.

Selling, General and Administrative Expenses

Selling, general and administrative expenses increased 2.8% from \$131.8 million in 2016 to \$135.6 million in 2017. Selling, general and administrative expenses include personnel costs for administration, finance, information technology, human resources, sales and marketing, and general management, as well as rent, utilities, legal and accounting expenses, bad debt expense, advertising, promotional material, trade show expenses, and related travel costs. The increase in selling, general and administrative expenses is primarily attributable to increases in ERP implementation expense, deferred compensation expense, travel expense, and stock-based compensation expense, partially offset by a decrease in performance-based compensation expense.

Selling, general and administrative expenses as a percentage of sales decreased from 20.7% for the year ended December 31, 2016 to 20.3% for the year ended December 31, 2017. Selling, general and administrative expenses as a percentage of sales will generally fluctuate whenever there is a significant fluctuation in revenues for the periods being compared.

Research and Development Expenses

Research and development expenses increased 4.6% from \$124.9 million in 2016 to \$130.7 million in 2017. The increase in research and development expenses is primarily attributable to an increase in labor and engineering materials related to customer specific projects, contract services and amortization of intangibles acquired in the third quarter of 2016.

Research and development expenses as a percentage of sales remained constant at 19.6% for the years ended December 31, 2016 and 2017. Research and development expenses as a percentage of sales will fluctuate whenever there are incremental product development activities or significant fluctuations in revenues for the periods being compared.

Interest and Dividend Income

Interest and dividend income increased by 11.8% from \$3.9 million in 2016 to \$4.4 million in 2017. The increase in interest and dividend income is primarily attributable to an increase in the rate of return on investments.

Interest Expense

Interest expense, which is primarily related to our taxable revenue bond, remained consistent at \$0.6 million in 2016 and 2017, as we had no substantial change in our fixed-rate borrowing. See “Financing Activities” in “Liquidity and Capital Resources” below for additional information on our taxable revenue bond.

Net Investment Gain

Net investment gain decreased by 20.9% from \$5.9 million in 2016 to \$4.7 million in 2017. The decrease in realized investment gains is primarily attributable to decreased gains from the sale of equity securities. See “Investing Activities” in “Liquidity and Capital Resources” below for additional information.

Other Income (Expense), net

Other income (expense), net, comprised primarily of miscellaneous income and expense, gains and losses on foreign currency transactions, gains and losses on foreign exchange forward contracts, investment account management fees, and scrap raw material sales, increased 147.0% from \$0.5 million of expense in 2016 to \$1.2 million of expense in 2017. The change is primarily attributable to increased losses on our foreign exchange contracts.

Gain on Bargain Purchase of a Business

Gain on bargain purchase of a business in 2016 is related to our acquisition of key fiber access products, technologies and service relationships from subsidiaries of CommScope, Inc. on September 13, 2016. See Note 2 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Provision for Income Taxes

Our effective tax rate increased from 24.9% in 2016 to 46.7% in 2017. The increase in the effective tax rate between the two periods is primarily attributable to the Tax Cuts and Jobs Act, which was signed into law on December 22, 2017. As a result of the new law, we recognized an estimated expense of \$11.9 million in the fourth quarter of 2017, of which \$9.2 million related to the write-down of deferred tax assets and \$2.7 million related to tax on unrepatriated foreign earnings. See Note 12 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Net Income

As a result of the above factors, net income decreased from \$35.2 million in 2016 to \$23.8 million in 2017. As a percentage of sales, net income decreased from 5.5% in 2016 to 3.6% in 2017.

Liquidity and Capital Resources

Liquidity

We currently expect to finance our operations with cash flow from operations. We have used, and expect to continue to use, the cash generated from operations for working capital, business acquisitions, purchases of treasury stock, shareholder dividends, and other general corporate purposes, including product development activities to enhance our existing products and develop new products and expansion of our sales and marketing activities. We believe our cash and cash equivalents, investments and cash generated from operations to be adequate to meet our operating and capital needs for at least the next 12 months.

At December 31, 2018, cash on hand was \$105.5 million and short-term investments were \$3.2 million, which resulted in available short-term liquidity of \$108.7 million, of which \$87.1 million was held by our foreign subsidiaries. At December 31, 2017, cash on hand was \$86.4 million and short-term investments were \$16.1 million, which resulted in available short-term liquidity of \$102.6 million, of which \$56.8 million was held by our foreign subsidiaries. The increase in short-term liquidity from December 31, 2017 to December 31, 2018 is primarily attributable to cash held by certain foreign subsidiaries, at least some of which we expect to repatriate as tax and regulatory considerations may allow.

Operating Activities

Our working capital, which consists of current assets less current liabilities, decreased 22.5% from \$306.3 million as of December 31, 2017 to \$237.4 million as of December 31, 2018. The current ratio, defined as current assets divided by current liabilities, decreased from 3.87 as of December 31, 2017 to 3.01 as of December 31, 2018. The decrease in our working capital and current ratio is primarily attributable to a decrease in net accounts receivable, inventory, and short term investments as well as an increase in income tax payable. The quick ratio, defined as cash and cash equivalents, short-term investments, and net accounts receivable, divided by current liabilities, decreased from 2.31 as of December 31, 2017 to 1.76 as of December 31, 2018. The decrease in the quick ratio is primarily attributable to a decrease in net accounts receivable and short term investments with an increase in income taxes payable. This decrease was slightly offset by an increase in cash and cash equivalents.

Net accounts receivable decreased 31.1% from \$144.2 million at December 31, 2017 to \$99.4 million at December 31, 2018. Our allowance for doubtful accounts was \$0.1 million at December 31, 2018. We did not have an allowance for doubtful accounts at December 31, 2017. Quarterly accounts receivable DSO decreased from 105 days as of December 31, 2017 to 65 days as of December 31, 2018. The decrease in net accounts receivable and DSO is attributable to customer specific payment terms agreed upon in 2017 that became due in the first quarter of 2018 and the timing of sales and other collections during the quarter.

Other receivables increased 38.1% from \$26.6 million at December 31, 2017 to \$36.7 million at December 31, 2018. The increase in other receivables is primarily attributable to an increase in contract assets, purchasing shipments, investment loan receivable and income tax receivables.

On February 25, 2019, one of the Company's customers filed for voluntary Chapter 11 bankruptcy as a result of a court ruling resulting in a substantial legal judgment against the customer. In 2018, this customer accounted for less than 5% of the Company's revenue. As of December 31, 2018, the Company had \$2.6 million related to product and services revenue and \$0.3 million related to a leased equipment arrangement included in accounts receivable on the Consolidated Balance Sheet that was due from this customer. As of December 31, 2018, the Company had \$9.4 million included in other receivables related to a leased equipment arrangement on its Consolidated Balance Sheet that was due from this customer. Since December 31, 2018, and through the date of this filing, all \$2.6 million of the outstanding products and services accounts receivable and \$0.1 million of the outstanding accounts receivable related

to leased equipment have been collected. Additionally, \$1.7 million of the outstanding other receivables related to leased equipment have been collected. Therefore, there is potential risk of uncollectibility up to \$7.8 million on the remaining outstanding receivable balances as of December 31 2018. The Company has evaluated the collectibility of the remaining receivable balances with the best available and applicable information as of the date of this filing and the impact was not material to the consolidated financial statements as of December 31, 2018. The Company will continue to evaluate the collectibility of the remaining accounts receivable balances in subsequent reporting periods. Additionally, it is uncertain at this time the impact this voluntary bankruptcy filing might have on the Company's operating income prospectively; however, the Company believes it will not have a significant impact on the Company's liquidity and capital resources.

Annual inventory turnover decreased from 3.19 turns as of December 31, 2017 to 2.93 turns as of December 31, 2018. Inventory decreased 18.5% from \$122.5 million at December 31, 2017 to \$99.8 million at December 31, 2018. We expect inventory levels to fluctuate as we attempt to maintain sufficient inventory in response to seasonal cycles of our business ensuring competitive lead times while managing the risk of inventory obsolescence that may occur due to rapidly changing technology and customer demand.

Accounts payable increased 0.7% from \$60.6 million at December 31, 2017 to \$61.1 million at December 31, 2018. Accounts payable will fluctuate due to variations in the timing of the receipt of supplies, inventory and services and our subsequent payments for these purchases.

Investing Activities

Capital expenditures totaled approximately \$8.1 million, \$14.7 million and \$21.4 million for the years ended December 31, 2018, 2017 and 2016, respectively. These expenditures were primarily used to purchase computer hardware, software, manufacturing and test equipment, and building improvements.

Our combined short-term and long-term investments decreased \$34.3 million from \$146.4 million at December 31, 2017 to \$112.1 million at December 31, 2018. This decrease reflects the impact of our cash used for business acquisitions, share repurchases, shareholder dividends, property, plant and equipment purchases, as well as net realized losses on these investments.

We invest all available cash not required for immediate use in operations primarily in securities that we believe bear minimal risk of loss. At December 31, 2018, these investments included corporate bonds of \$20.7 million, municipal fixed-rate bonds of \$1.3 million, asset-backed bonds of \$5.2 million, mortgage/agency-backed bonds of \$3.8 million, U.S. government bonds of \$9.2 million, and foreign government bonds of \$0.6 million. At December 31, 2017, these investments included corporate bonds of \$32.5 million, municipal fixed-rate bonds of \$2.9 million, asset-backed bonds of \$6.5 million, mortgage/agency-backed bonds of \$5.5 million, U.S. government bonds of \$14.3 million and foreign government bonds of \$0.7 million. As of December 31, 2018, our corporate bonds, municipal fixed-rate bonds, asset-backed bonds, mortgage/agency-backed bonds, U.S. government bonds, and foreign government bonds were classified as available-for-sale and had a combined duration of 1.55 years with an average credit rating of A+. Because our bond portfolio has a high-quality rating and contractual maturities of short duration, we are able to obtain prices for these bonds derived from observable market inputs, or for similar securities traded in an active market, on a daily basis.

Our long-term investments decreased 16.5% from \$130.3 million at December 31, 2017 to \$108.8 million at December 31, 2018. Long-term investments at December 31, 2018 and December 31, 2017 included investments in various marketable equity securities classified as long-term investments with a fair market value of \$27.0 million and \$35.7 million, at December 31, 2018 and December 31, 2017, respectively. Our long-term investments also included an investment in a certificate of deposit of \$25.6 million and \$27.8 million, respectively, which serves as collateral for our revenue bond, as discussed below.

Long-term investments at December 31, 2018 and 2017 also included \$18.3 million and \$19.9 million, respectively, related to our deferred compensation plan, and \$0.4 million and \$0.5 million, respectively, of other investments, consisting of interests in two private equity funds.

Acquisition of businesses, net of cash acquired, totaled \$22.0 million, zero and \$0.9 million for the years ended December 31, 2018, 2017 and 2016, respectively. See Note 2 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Financing Activities

In conjunction with the 1995 expansion of our Huntsville, Alabama, facility, we were approved for participation in an incentive program offered by the State of Alabama Industrial Development Authority (the Authority). Pursuant to the program, on January 13, 1995, the Authority issued \$20.0 million of its taxable revenue bonds and loaned the proceeds from the sale of the bonds to ADTRAN. The bonds were originally purchased by AmSouth Bank of Alabama (now Regions Bank of Alabama) (the Bank). Wachovia Bank, N.A., Nashville, Tennessee (formerly First Union National Bank of Tennessee) (the Bondholder), which was acquired by Wells Fargo & Company on December 31, 2008, purchased the original bonds from the Bank and made further advances to the Authority, bringing the total amount outstanding to \$50.0 million. An Amended and Restated Taxable Revenue Bond (Amended and Restated Bond) was issued and the original financing agreement was amended. The Amended and Restated Bond bears interest, payable monthly. The interest rate is 2% per annum. The Amended and Restated Bond matures on January 1, 2020, and is currently outstanding in the aggregate principal amount of \$25.6 million. The estimated fair value of the bond using a level 2 valuation technique at December 31, 2018 was approximately \$25.4 million, based on a debt security with a comparable interest rate and maturity and a Standard & Poor's credit rating of AAA. We are required to make payments to the Authority in amounts necessary to pay the interest on the Amended and Restated Bond. Included in long-term investments at December 31, 2018 is \$25.6 million which is invested in a restricted certificate of deposit. These funds serve as a collateral deposit against the principal of this bond, and we have the right to set-off the balance of the Amended and Restated Bond with the collateral deposit in order to reduce the balance of the indebtedness.

In conjunction with this program, we are eligible to receive certain economic incentives from the state of Alabama that reduce the amount of payroll withholdings that we are required to remit to the state for those employment positions that qualify under the program. We realized economic incentives related to payroll withholdings totaling \$1.4 million, \$1.5 million and \$1.3 million for the years ended December 31, 2018, 2017 and 2016.

We made principal payments of \$1.1 million for each of the years ended December 31, 2018 and 2017 . At December 31, 2018 and 2017, \$1.0 million and \$1.1 million, respectively of the bond debt was classified as a current liability in accounts payable in the Consolidated Balance Sheets included in Item 8 of this report.

Dividends

During 2018, 2017 and 2016, we paid shareholder dividends totaling \$17.3 million, \$17.4 million and \$17.6 million, respectively. The Board of Directors presently anticipates that it will declare a regular quarterly dividend so long as the present tax treatment of dividends exists and adequate levels of liquidity are maintained. The following table shows dividends per common share paid to our shareholders in each quarter of 2018, 2017 and 2016.

Dividends per Common Share

	2018	2017	2016
First Quarter	\$0.09	\$0.09	\$0.09
Second Quarter	\$0.09	\$0.09	\$0.09
Third Quarter	\$0.09	\$0.09	\$0.09
Fourth Quarter	\$0.09	\$0.09	\$0.09

Stock Repurchase Program

Since 1997, our Board of Directors has approved multiple share repurchase programs that have authorized open market repurchase transactions of our common stock, which are implemented through open market or private purchases from time to time as conditions warrant. For the years 2018, 2017 and 2016, we repurchased 1.0 million shares, 0.9 million shares and 1.4 million shares, respectively, for a cost of \$15.5 million, \$17.3 million and \$25.8 million, respectively, at an average price of \$15.52, \$20.27 and \$18.29 per share, respectively. We currently have authorization to repurchase an additional 2.6 million shares of our common stock under the current authorization of up to 5.0 million shares.

Stock Option Exercises

To accommodate employee stock option exercises, we issued 0.1 million shares of treasury stock for \$1.5 million during the year ended December 31, 2018, 0.7 million shares of treasury stock for \$13.4 million during the year ended December 31, 2017, and 0.3 million shares of treasury stock for \$4.7 million during the year ended December 31, 2016.

Off-Balance Sheet Arrangements and Contractual Obligations

We do not have off-balance sheet financing arrangements and have not engaged in any related party transactions or arrangements with unconsolidated entities or other persons that are reasonably likely to materially affect liquidity or the availability of or requirements for capital resources.

We have various contractual obligations and commercial commitments. The following table sets forth, in millions, the annual payments we are required to make under contractual cash obligations and other commercial commitments at December 31, 2018.

Contractual Obligations

(In millions)	Total	2019	2020	2021	2022	2023	After 2023
Short-term and long-term debt	\$25.6	\$—	\$25.6	\$—	\$—	\$—	\$—
Interest on short-term and long-term debt	0.5	0.5	—	—	—	—	—
Purchase obligations	127.1	126.1	0.9	0.1	—	—	—
Operating lease obligations	14.4	3.9	3.6	2.8	2.0	1.3	0.8
Totals	\$167.6	\$130.5	\$30.1	\$2.9	\$2.0	\$1.3	\$0.8

We are required to make payments necessary to pay the interest on the Amended and Restated Bond, currently outstanding in the aggregate principal amount of \$25.6 million. The bond matures on January 1, 2020, and bears interest at the rate of 2% per annum. Included in long-term investments are \$25.6 million of restricted funds, which is a collateral deposit against the principal amount of this bond. We made principal payments of \$1.1 million for each of the years ended December 31, 2018 and 2017. We anticipate making a principal payment in 2019. At December 31, 2018 and 2017, \$1.0 million and \$1.1 million, respectively of the bond debt was classified as a current liability in accounts payable in the Consolidated Balance Sheets included in Item 8 of this report. See Note 11 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Purchase obligations primarily relate to open purchase orders to our contract manufacturers, component suppliers, service partners, and other vendors.

Operating lease obligations primarily relate to future minimum rental payments under non-cancelable operating leases, including renewals determined to be reasonably assured, with original maturities of greater than 12 months.

We have committed to invest up to an aggregate of \$7.9 million in two private equity funds, and we have contributed \$8.4 million as of December 31, 2018, of which \$7.7 million has been applied to these commitments. The additional \$0.2 million commitment has been excluded from the table above due to the uncertainty of when it will be applied.

We also have obligations related to uncertain income tax positions that have been excluded from the table above due to the uncertainty of when the related expense will be recognized. See Note 12 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Recently Issued Accounting Pronouncements

For a discussion of recently issued accounting pronouncements, see Note 1 of Notes to Consolidated Financial Statements included in Item 8 of this report for additional information.

Critical Accounting Policies and Estimates

An accounting policy is deemed to be critical if it requires an accounting estimate to be made based on assumptions about matters that are highly uncertain at the time the estimate is made, if different estimates reasonably could have been used, or if changes in the accounting estimate that are reasonably likely to occur could materially impact the results of financial operations. We believe the following critical accounting policies affect our more significant judgments and estimates used in the preparation of our consolidated financial statements. These policies have been consistently applied across our two reportable segments: (1) Network Solutions and (2) Services & Support.

Revenue Recognition

Revenue is measured based on the consideration we expect to receive in exchange for transferring goods or providing services to a customer and as performance obligations under the terms of the contract are satisfied. Generally, this occurs with the transfer of control of a product or service to the customer. For transactions where there are multiple performance obligations, we account for individual products and services separately if they are distinct (if a product or service is separately identifiable from other items and if a customer can benefit from it on its own or with other resources that are readily available to the customer). The consideration, including any discounts, is allocated between separate products and services based on their stand-alone selling prices. The stand-alone selling prices are determined based on the prices at which we sell the separate products and services and are allocated based on each item's relative value to the total value of the products and services in the arrangement. For items that are not sold separately, we estimate stand-alone selling prices primarily using the "expected cost plus a margin" approach. Payment terms are generally 30 days in the U.S. and typically longer in many geographic markets outside the U.S. Shipping fees are recorded as revenue and the related cost is included in cost of sales. Sales, value-added and other taxes collected concurrently with revenue-producing activities are excluded from revenue. Costs of obtaining a contract are capitalized and amortized over the period that the related revenue is recognized if greater than one year. We have elected to apply the practical expedient related to the incremental costs of obtaining contracts and recognize those costs as an expense when incurred if the amortization period of the assets is one year or less. These costs are included in selling, general and administrative expenses. Capitalized costs with an amortization period greater than one year were immaterial.

The following is a description of the principal activities from which we generate our revenue by reportable segment.

Network Solutions Segment

Network Solutions includes software and hardware products and software defined next-generation virtualized solutions used in service provider or business networks, as well as prior generation products. The majority of the revenue from this segment is from hardware sales.

Hardware and Software Revenue

Revenue from hardware sales is recognized when control is transferred to our customers, which is generally when we ship the products. Shipping terms are generally FOB shipping point. This segment also includes revenues from software license sales which is recognized at delivery and transfer of control to the customer. Revenue is recorded net of estimated discounts and rebates using historical trends. Customers are typically invoiced when control is transferred and revenue is recognized. Our products generally include assurance-based warranties of 90 days to five years for product defects, which are accrued at the time revenue is recognized.

In certain transactions, we are also the lessor in sales-type lease arrangements for network equipment that have terms of 18 months to five years. These arrangements typically include network equipment, network implementation services and maintenance services. Product revenue for these leases is generally recorded when we transfer control of the product to our customers. Revenue for network implementation and maintenance services is recognized as described below. Customers are typically invoiced and pay in equal installments over the lease term. In relation to these lease agreements, during the years ended December 31, 2018, 2017 and 2016 we recognized revenue of \$13.7 million, \$16.5 million and \$2.7 million, respectively.

Services & Support Segment

To complement our Network Solutions segment, we offer a complete portfolio of maintenance, network implementation, and solutions integration and managed services, which include hosted cloud services and subscription services.

Maintenance Revenue

Our maintenance service periods range from one month to five years. Customers are typically invoiced and pay for maintenance services at the beginning of the maintenance period. We recognize revenue for maintenance services on a straight-line basis over the maintenance period in services revenue as our customers benefit evenly throughout the contract term and deferred revenues are recorded in current and non-current unearned revenue.

Network Implementation Revenue

We recognize revenue for network implementation, which primarily consists of engineering, execution and enablement services, at a point in time when each performance obligation is complete. If we have recognized revenue, but have not billed the customer, the right to consideration is recognized as a contract asset that is included in other receivables in the Consolidated Balance Sheet. The contract asset is transferred to accounts receivable when the completed performance obligation is invoiced to the customer.

Inventory

We carry our inventory at the lower of cost and net realizable value, with cost being determined using the first-in, first-out method. We use standard costs for material, labor, and manufacturing overhead to value our inventory. Our standard costs are updated on at least a quarterly basis and any variances are expensed in the current period; therefore,

our inventory costs approximate actual costs at the end of each reporting period. We write down our inventory for estimated obsolescence or unmarketable inventory by an amount equal to the difference between the cost of inventory and the estimated fair value based upon assumptions about future demand and market conditions. If actual future demand or market conditions are less favorable than those projected by management, we may be required to make additional inventory write-downs. Our reserve for excess and obsolete inventory was \$30.0 million and \$23.4 million at December 31, 2018 and 2017, respectively. Inventory disposals charged against the reserve were \$0.4 million, \$8.3 million and \$4.7 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Stock-Based Compensation

For purposes of determining the estimated fair value of our stock option awards on the date of grant, we use the Black-Scholes Model. This model requires the input of certain assumptions that require subjective judgment. These assumptions include, but are not limited to, expected stock price volatility over the term of the awards and actual and projected employee stock option exercise behaviors. Because our stock option awards have characteristics significantly different from those of traded options, and because changes in the input assumptions can materially affect the fair value estimate, the existing model may not provide a reliable, single measure of the fair value of our stock option awards. For purposes of determining the estimated fair value of our market-based performance stock unit (PSU) awards on the date of grant, we use a Monte Carlo Simulation valuation method. These PSUs are subject to a market condition based on the relative total shareholder return of ADTRAN against all of the companies in the NASDAQ Telecommunications Index and vest at the end of a three-year performance period. The fair value of performance-based PSUs, restricted stock units (RSUs) and restricted stock is equal to the closing price of our stock on the business day immediately preceding the grant date. Compensation expense related to unvested performance-based PSUs will be recognized over the requisite service period of three years as the achievement of the performance obligation becomes probable. Management will continue to assess the assumptions and methodologies used to calculate the estimated fair value of stock-based compensation. Circumstances may change and additional data may become available over time, which could result in changes to these assumptions and methodologies and thereby materially impact our fair value determination. If factors change in future periods, the compensation expense that we record may differ significantly from what we have recorded in the current period.

Business Combinations

The Company records assets acquired, liabilities assumed, contractual contingencies, when applicable, and intangible assets recognized as part of business combinations based on their fair values on the date of acquisition. The excess of the purchase price over the estimated fair values of the net tangible and intangible assets acquired is recorded as goodwill. If the estimated fair values of net tangible and intangible assets acquired exceed the purchase price, a bargain purchase gain is recorded. The Company's estimates of fair value are based on historical experience, industry knowledge, certain information obtained from the management of the acquired company and, in some cases, valuations performed by independent third-party firms. The results of operations of acquired companies are included in the accompanying condensed consolidated statements of operations since their dates of acquisition. Costs incurred to complete the business combination, such as legal, accounting, or other professional fees, are charged to general and administrative expenses as they are incurred.

Goodwill

Goodwill represents the excess purchase price over the fair value of net assets acquired. We evaluate the carrying value of goodwill during the fourth quarter of each year and between annual evaluations if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying

amount. We have elected to first assess the qualitative factors to determine whether it is more likely than not that the fair value of the reporting unit to which the goodwill is assigned is less than its carrying amount as a basis for determining whether it is necessary to perform the two-step impairment test. If we determine that it is more likely than not that its fair value is less than its carrying amount, then the two-step impairment test will be performed. Based on the results of our qualitative assessment in 2018, we concluded that it was not necessary to perform the two-step impairment test. There were no impairment losses on goodwill recognized during the years ended December 31, 2018, 2017 and 2016.

Income Taxes

We estimate our income tax provision or benefit in each of the jurisdictions in which we operate, including estimating exposures related to examinations by taxing authorities. We also make judgments regarding the realization of deferred tax assets, and establish valuation allowances where we believe it is more likely than not that future taxable income in certain jurisdictions will be insufficient to realize these deferred tax assets. Our estimates regarding future taxable income and income tax provision or benefit may vary due to changes in market conditions, changes in tax laws, or other factors. If our assumptions, and consequently our estimates, change in the future, the valuation allowances we have established may be increased or decreased, impacting future income tax expense. At December 31, 2018 and 2017, the Company had federal and state net operating loss carryforwards of \$16.1 million and \$2.8 million, respectively. These carryforwards are the result of acquisitions in 2011 and 2018 and domestic operating losses in 2018. A valuation allowance of \$0.1 million has been established against these losses as losses in a particular state may not be recognized. At December 31, 2018 and 2017, the Company had state tax credit carryforwards of \$3.7 million, which expire between 2019 and 2030. A valuation allowance of \$3.3 million and \$3.4, million, respectively, has been established against these credits. These state credits were generated primarily in a particular state where we no longer generate sufficient state income. In addition, at December 31, 2018 and 2017, the Company had foreign loss carryforwards of \$3.1 million. A majority of these loss carryforwards are the result of an acquisition in 2009. A valuation allowance of \$2.4 million and \$2.5 million, respectively, has been established against the net operating losses in a foreign jurisdiction where the Company has limited business. We believe it is more likely than not that we will not realize the full benefits of some of our deferred tax assets, and accordingly, we have provided a valuation allowance against that piece.

We establish reserves to remove some or all of the tax benefit of any of our tax positions at the time we determine that the positions become uncertain. We adjust these reserves, including any impact on the related interest and penalties, as facts and circumstances change.

Liability for Warranty

Our products generally include warranties of 90 days to five years for product defects. We accrue for warranty returns at the time revenue is recognized based on our historical return rate and an estimate of the cost to repair or replace the defective products. We engage in extensive product quality programs and processes, including actively monitoring and evaluating the quality of our component suppliers. Our products continue to become more complex in both size and functionality as many of our product offerings migrate from line card applications to total systems. The increasing complexity of our products will cause warranty incidences, when they arise, to be more costly. Our estimates regarding future warranty obligations may change due to product failure rates, material usage, and other rework costs incurred in correcting a product failure. In addition, from time to time, specific warranty accruals may be recorded if unforeseen problems arise. Should our actual experience relative to these factors be worse than our estimates, we will be required to record additional warranty expense. Alternatively, if we provide for more reserves than we require, we will reverse a portion of such provisions in future periods. The liability for warranty obligations totaled \$8.6 million and \$9.7 million at December 31, 2018 and 2017, respectively. These liabilities are included in accrued expenses in the accompanying consolidated balance sheets.

Pension Benefit Obligations

Pension benefit plan obligations are based on various assumptions used by our actuaries in calculating these amounts. These assumptions include discount rates, compensation rate increases, expected return on plan assets, retirement rates and mortality rates. Actual results that differ from the assumptions and changes in assumptions could affect future expenses and obligations. Our net pension liability totaled \$13.1 million and \$8.3 million at December 31, 2018 and 2017, respectively. This liability is included in other non-current liabilities in the accompanying consolidated balance sheets.

Subsequent Events

On January 23, 2019, the Board declared a quarterly cash dividend of \$0.09 per common share to be paid to shareholders of record at the close of business on February 7, 2019. The quarterly dividend payment was \$4.3 million and was paid on February 21, 2019. In July 2003, our Board of Directors elected to begin declaring quarterly dividends on our common stock considering the tax treatment of dividends and adequate levels of Company liquidity.

During the first quarter and as of February 26, 2019, we have repurchased 13,000 shares of our common stock through open market purchases at an average cost of \$14.06 per share. We currently have the authority to purchase an additional 2.5 million shares of our common stock under the current plan approved by the Board of Directors.

In February 2019, \$1.0 million of an outstanding investment loan due to ADTRAN was replaced with a secured loan in that amount. The remaining balance of this investment loan was converted to participating preferred shares of the respective company.

In February 2019, we announced the restructuring of our workforce in Germany, which includes the closure of the office location in Munich, Germany accompanied by relocation or severance benefits for the affected employees and a voluntary early retirement offering to certain other employees. The restructuring is expected to be completed in the fourth quarter of 2019. ADTRAN does not have sufficient information currently on which to estimate the liability associated with this restructuring, including costs associated with employee severance and relocation.

On February 25, 2019, one of the Company's customers filed for voluntary Chapter 11 bankruptcy as a result of a court ruling resulting in a substantial legal judgment against the customer. In 2018, this customer accounted for less than 5% of the Company's revenue. As of December 31, 2018, the Company had \$2.6 million related to product and services revenue and \$0.3 million related to a leased equipment arrangement included in accounts receivable on the Consolidated Balance Sheet that was due from this customer. As of December 31, 2018, the Company had \$9.4 million included in other receivables related to a leased equipment arrangement on its Consolidated Balance Sheet that was due from this customer. Since December 31, 2018, and through the date of this filing, all \$2.6 million of the outstanding products and services accounts receivable and \$0.1 million of the outstanding accounts receivable related to leased equipment have been collected. Additionally, \$1.7 million of the outstanding other receivables related to leased equipment have been collected. Therefore, there is potential risk of uncollectibility up to \$7.8 million on the remaining outstanding receivable balances as of December 31, 2018. The Company has evaluated the collectibility of the remaining receivable balances with the best available and applicable information as of the date of this filing and the impact was not material to the consolidated financial statements as of December 31, 2018. The Company will continue to evaluate the collectibility of the remaining accounts receivable balances in subsequent reporting periods. Additionally, it is uncertain at this time the impact this voluntary bankruptcy filing might have on the Company's operating income prospectively; however, the Company believes it will not have a significant impact on the Company's liquidity and capital resources.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to financial market risks, including changes in interest rates, foreign currency rates and prices of marketable equity and fixed-income securities. The primary objective of the large majority of our investment activities is to preserve principal while at the same time achieving appropriate yields without significantly increasing risk. To achieve this objective, a majority of our marketable securities are investment grade, fixed-rate bonds and municipal money market instruments denominated in U.S. dollars. Our investment policy provides limitations for issuer concentration, which limits, at the time of purchase, the concentration in any one issuer to 5% of the market value of our total investment portfolio.

We maintain depository investments with certain financial institutions. Although these depository investments may exceed government insured depository limits, we have evaluated the credit-worthiness of these financial institutions, and determined the risk of material financial loss due to exposure of such credit risk to be minimal. As of December 31, 2018, \$102.2 million of our cash and cash equivalents, primarily certain domestic money market funds and foreign depository accounts, were in excess of government provided insured depository limits.

As of December 31, 2018, approximately \$42.9 million of our cash and investments may be directly affected by changes in interest rates. We have performed a hypothetical sensitivity analysis assuming market interest rates increase or decrease by 50 basis points (bps) for an entire year, while all other variables remain constant. At December 31, 2018, we held \$5.7 million of cash and variable-rate investments where a change in interest rates would impact our interest income. A hypothetical 50 bps decline in interest rates as of December 31, 2018 would reduce annualized interest income on our cash and investments by approximately \$.01 million. In addition, we held \$37.2 million of fixed-rate bonds whose fair values may be directly affected by a change in interest rates. A hypothetical 50 bps increase in interest rates as of December 31, 2018 would reduce the fair value of our fixed-rate bonds by approximately \$0.3 million.

We are exposed to changes in foreign currency exchange rates to the extent that such changes affect our revenue and gross margin on revenue derived from some international customers, expenses, and assets and liabilities held in non-functional currencies related to our foreign subsidiaries. Our primary exposures to foreign currency exchange rate movements are with our German subsidiary, whose functional currency is the Euro, our Australian subsidiary, whose functional currency is the Australian dollar, and our Mexican subsidiary, whose functional currency is the U.S. dollar. We are exposed to changes in foreign currency exchange rates to the extent of our German subsidiary's use of contract manufacturers and raw material suppliers whom we predominantly pay in U.S. dollars. As a result, changes in currency exchange rates could cause variations in gross margin in the products that we sell in the EMEA region.

We have certain international customers who are invoiced or pay in a non-functional currency. Changes in the monetary exchange rates used to invoice such customers versus the functional currency of the entity billing such customers may adversely affect our results of operations and financial condition. To manage the volatility relating to these typical business exposures, we may enter into various derivative transactions, when appropriate. We do not hold or issue derivative instruments for trading or other speculative purposes. All non-functional currencies billed would result in a combined hypothetical gain or loss of \$2.1 million if the U.S. dollar weakened or strengthened 10% against the billing currencies. This increase in this fluctuation compared to prior periods is mainly due to an increase in U.S. dollar-denominated billings in a non-U.S. dollar denominated subsidiary as well as an increase in international sales. Although we do not currently hold any derivative instruments, any gain or loss would be partially mitigated by any derivative instruments held.

As of December 31, 2018, we had no material contracts subject to currency revaluation, other than accounts receivable and accounts payable denominated in foreign currencies. As of December 31, 2018, we had no forward contracts outstanding.

For further information about the fair value of our available-for-sale investments and our derivative and hedging activities as of December 31, 2018, see Notes 5 and 6 of Notes to Consolidated Financial Statements included in Item 8 of this report.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The following consolidated financial statements are contained in this report.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of ADTRAN, Inc.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of ADTRAN, Inc. and its subsidiaries (the "Company") as of December 31, 2018 and 2017, and the related consolidated statements of income, comprehensive income, changes in stockholders' equity and cash flows for each of the three years in the period ended December 31, 2018, including the related notes and financial statement schedule listed in the accompanying index (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that

respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/PricewaterhouseCoopers LLP

Birmingham, Alabama

February 28, 2019

We have served as the Company's auditor since 1986.

Financial Statements

ADTRAN, INC.

Consolidated Balance Sheets

(In thousands, except per share amounts)

December 31, 2018 and 2017

ASSETS	2018	2017
Current Assets		
Cash and cash equivalents	\$ 105,504	\$ 86,433
Short-term investments	3,246	16,129
Accounts receivable, less allowance for doubtful accounts of \$128 and \$— at December 31, 2018 and 2017, respectively	99,385	144,150
Other receivables	36,699	26,578
Inventory, net	99,848	122,542
Prepaid expenses and other current assets	10,744	17,282
Total Current Assets	355,426	413,114
Property, plant and equipment, net	80,635	85,079
Deferred tax assets, net	37,187	23,428
Goodwill	7,106	3,492
Intangibles, net	33,183	4,661
Other assets	5,668	9,064
Long-term investments	108,822	130,256
Total Assets	\$ 628,027	\$ 669,094
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current Liabilities		
Accounts payable	\$ 61,054	\$ 60,632
Unearned revenue	17,940	13,070
Accrued expenses	11,746	13,232
Accrued wages and benefits	14,752	15,948
Income tax payable, net	12,518	3,936
Total Current Liabilities	118,010	106,818
Non-current unearned revenue	5,296	4,556
Other non-current liabilities	33,842	34,209
Bonds payable	24,600	25,600
Total Liabilities	181,748	171,183
Commitments and contingencies (see Note 15)		
Stockholders' Equity		
Common stock, par value \$0.01 per share; 200,000 shares authorized;		
79,652 shares issued and 47,751 shares outstanding at December 31, 2018 and		
79,652 shares issued and 48,485 shares outstanding at December 31, 2017	797	797
Additional paid-in capital	267,670	260,515

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Accumulated other comprehensive loss	(14,416)	(3,295)
Retained earnings	883,975	922,178
Less treasury stock at cost: 31,901 and 31,167 shares at December 31, 2018 and 2017, respectively	(691,747)	(682,284)
Total Stockholders' Equity	446,279	497,911
Total Liabilities and Stockholders' Equity	\$628,027	\$669,094

See accompanying notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Income (Loss)

(In thousands, except per share amounts)

Years ended December 31, 2018, 2017 and 2016

	2018	2017	2016
Sales			
Products	\$458,232	\$540,396	\$525,502
Services	71,045	126,504	111,279
Total Sales	529,277	666,900	636,781
Cost of Sales			
Products	278,929	279,563	270,705
Services	46,783	83,702	74,746
Total Cost of Sales	325,712	363,265	345,451
Gross Profit	203,565	303,635	291,330
Selling, general and administrative expenses	124,440	135,583	131,848
Research and development expenses	124,547	130,666	124,909
Operating Income (Loss)	(45,422)	37,386	34,573
Interest and dividend income	4,026	4,380	3,918
Interest expense	(533)	(556)	(572)
Net investment gain (loss)	(4,050)	4,685	5,923
Other income (expense), net	1,286	(1,208)	(489)
Gain on bargain purchase of a business	11,322	—	3,542
Income (Loss) before (Provision) Benefit for Income Taxes	(33,371)	44,687	46,895
(Provision) benefit for income taxes	14,029	(20,847)	(11,666)
Net Income (Loss)	\$(19,342)	\$23,840	\$35,229
Weighted average shares outstanding – basic	47,880	48,153	48,724
Weighted average shares outstanding – diluted	47,880	48,699	48,949
Earnings (loss) per common share – basic	\$(0.40)	\$0.50	\$0.72
Earnings (loss) per common share – diluted	\$(0.40)	\$0.49	\$0.72

See accompanying notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Comprehensive Income (Loss)

(In thousands)

Years ended December 31, 2018, 2017 and 2016

	2018	2017	2016
Net Income (Loss)	\$(19,342)	\$23,840	\$35,229
Other Comprehensive Income (Loss), net of tax			
Net unrealized gains (losses) on available-for-sale securities	(3,130)	2,163	(1,528)
Defined benefit plan adjustments	(3,755)	731	(1,122)
Foreign currency translation	(4,236)	5,999	(569)
Other Comprehensive Income (Loss), net of tax	(11,121)	8,893	(3,219)
Comprehensive Income (Loss), net of tax	\$(30,463)	\$32,733	\$32,010

See accompanying notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Changes in Stockholders' Equity

(In thousands)

Years ended December 31, 2018, 2017 and 2016

	Common	Common	Additional Paid-In	Retained	Treasury	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
	Shares	Stock	Capital	Earnings	Stock		
Balance at December 31, 2015	79,652	\$ 797	\$246,879	\$906,772	\$(665,319)	\$ (8,969)	\$ 480,160
Net income				35,229			35,229
Other comprehensive loss, net of tax						(3,219)	(3,219)
Dividend payments				(17,583)			(17,583)
Dividends accrued on unvested restricted stock units				(48)			(48)
Stock options exercised: 283 shares				(1,499)	6,216		4,717
PSUs, RSUs and restricted stock vested: 42 shares			(142)	(929)	929		(142)
Purchase of treasury stock: 1,411 shares					(25,817)		(25,817)
Income tax effect of stock compensation arrangements			(475)				(475)
Stock-based compensation expense			6,695				6,695
Balance at December 31, 2016	79,652	797	252,957	921,942	(683,991)	(12,188)	479,517
Net income				23,840			23,840
Other comprehensive income, net of tax						8,893	8,893
Dividend payments				(17,368)			(17,368)
Dividends accrued on unvested restricted stock units				(37)			(37)
Stock options exercised: 742 shares				(2,827)	16,239		13,412
PSUs, RSUs and restricted stock vested: 154 shares				(3,257)	2,816		(441)

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Purchase of treasury stock: 856 shares					(17,348)		(17,348)
Stock-based compensation expense		7,433					7,433
ASU 2016-09 adoption (see Note 1)			125	(115)			10
Balance at December 31, 2017	79,652	797	260,515	922,178	(682,284)	(3,295)	497,911
Net loss				(19,342)			(19,342)
ASU 2014-09 adoption (see Note 1)				278			278
ASU 2016-01 adoption (see Note 1)				3,220			3,220
Other comprehensive loss, net of tax						(11,121)	(11,121)
Dividend payments				(17,267)			(17,267)
Dividends accrued on unvested restricted stock units				(7)			(7)
Stock options exercised: 96 shares				(603)	2,086		1,483
PSUs, RSUs and restricted stock vested: 217 shares				(4,482)	3,983		(499)
Purchase of treasury stock: 1,001 shares					(15,532)		(15,532)
Stock-based compensation expense			7,155				7,155
Balance at December 31, 2018	79,652	\$ 797	\$ 267,670	\$ 883,975	\$(691,747)	\$(14,416)	\$ 446,279

See accompanying notes to consolidated financial statements.

ADTRAN, INC.

Consolidated Statements of Cash Flows

(In thousands)

Years ended December 31, 2018, 2017 and 2016

	2018	2017	2016
Cash flows from operating activities:			
Net income (loss)	\$(19,342)	\$23,840	\$35,229
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	15,891	15,692	14,407
Amortization of net premium (discount) on available-for-sale investments	(50)	425	643
Net (gain) loss on long-term investments	4,050	(4,685)	(5,923)
Net (gain) loss on disposal of property, plant and equipment	67	(145)	22
Gain on bargain purchase of a business	(11,322)	—	(3,542)
Stock-based compensation expense	7,155	7,433	6,695
Deferred income taxes	(17,257)	14,073	(2,685)
Change in operating assets and liabilities:			
Accounts receivable, net	49,200	(49,103)	(21,302)
Other receivables	(8,522)	(10,222)	4,101
Inventory	24,192	(15,518)	(10,887)
Prepaid expenses and other assets	10,727	(4,830)	(7,108)
Accounts payable	(3,799)	(17,742)	26,722
Accrued expenses and other liabilities	(3,226)	(5,455)	8,792
Income taxes payable	7,690	3,858	(3,162)
Net cash provided by (used in) operating activities	55,454	(42,379)	42,002
Cash flows from investing activities:			
Purchases of property, plant and equipment	(8,110)	(14,720)	(21,441)
Proceeds from disposals of property, plant and equipment	—	151	—
Proceeds from sales and maturities of available-for-sale investments	153,649	173,752	225,075
Purchases of available-for-sale investments	(123,209)	(93,141)	(209,172)
Acquisition of business, net of cash acquired	(22,045)	—	(943)
Net cash provided by (used in) investing activities	285	66,042	(6,481)
Cash flows from financing activities:			
Proceeds from stock option exercises	1,483	13,412	4,717
Purchases of treasury stock	(15,532)	(17,348)	(25,817)
Dividend payments	(17,267)	(17,368)	(17,583)
Payments on long-term debt	(1,100)	(1,100)	(1,100)
Net cash used in financing activities	(32,416)	(22,404)	(39,783)
Net increase (decrease) in cash and cash equivalents	23,323	1,259	(4,262)
Effect of exchange rate changes	(4,252)	5,279	(393)
Cash and cash equivalents, beginning of year	86,433	79,895	84,550
Cash and cash equivalents, end of year	\$105,504	\$86,433	\$79,895

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Supplemental disclosure of cash flow information

Cash paid during the year for interest	\$534	\$555	\$575
Cash paid during the year for income taxes	\$4,104	\$2,988	\$18,689
Supplemental disclosure of non-cash investing activities			
Purchases of property, plant and equipment included in accounts payable	\$62	\$408	\$2,103
Contingent payments	\$1,230	\$—	\$—

See accompanying notes to consolidated financial statements.

Notes to Consolidated Financial Statements

Note 1 – Nature of Business and Summary of Significant Accounting Policies

Principles of Consolidation

The consolidated financial statements include ADTRAN and its wholly-owned subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America (U.S. GAAP) requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenue and expense during the reporting period. Our more significant estimates include obsolete and excess inventory reserves, warranty reserves, customer rebates, determination and accrual of the deferred revenue components of multiple element sales agreements, estimated costs to complete obligations associated with deferred revenues and network installations, estimated income tax provision and income tax contingencies, fair value of stock-based compensation, impairment of goodwill, valuation and estimated lives of intangible assets, estimated pension liability, fair value of investments, and evaluation of other-than-temporary declines in the value of investments. Actual amounts could differ significantly from these estimates.

Cash and Cash Equivalents

Cash and cash equivalents represent demand deposits, money market funds, and short-term investments classified as available-for-sale with original maturities of three months or less. We maintain depository investments with certain financial institutions. Although these depository investments may exceed government insured depository limits, we have evaluated the credit worthiness of these applicable financial institutions, and determined the risk of material financial loss due to the exposure of such credit risk to be minimal. As of December 31, 2018, \$102.2 million of our cash and cash equivalents, primarily certain domestic money market funds and foreign depository accounts, were in excess of government provided insured depository limits.

Financial Instruments

The carrying amounts reported in the consolidated balance sheets for cash and cash equivalents, accounts receivable, and accounts payable approximate fair value due to the immediate or short-term maturity of these financial instruments. The carrying amount reported for bonds payable was \$25.6 million, compared to an estimated fair value of \$25.4 million, based on a debt security with a comparable interest rate and maturity and a Standard & Poor's credit rating of AAA.

Investments with contractual maturities beyond one year may be classified as short-term based on their highly liquid nature and because such marketable securities represent the investment of cash that is available for current operations. Despite the long-term nature of their stated contractual maturities, we routinely buy and sell these securities and we

believe we have the ability to quickly sell them to the remarketing agent, tender agent, or issuer at par value plus accrued interest in the event we decide to liquidate our investment in a particular variable rate demand note. All income generated from these investments was recorded as interest income. We have not been required to record any losses relating to variable rate demand notes.

Long-term investments represent a restricted certificate of deposit held at cost, deferred compensation plan assets, corporate bonds, municipal fixed-rate bonds, asset-backed bonds, mortgage/agency-backed bonds, U.S. and foreign government bonds, marketable equity securities and other equity investments. Marketable equity securities are reported at fair value as determined by the most recently traded price of the securities at the balance sheet date, although the securities may not be readily marketable due to the size of the available market. Any changes in fair value are recognized in net investment gain (loss). Realized gains and losses on sales of debt securities are computed under the specific identification method and are included in current income. See Note 5 of Notes to Consolidated Financial Statements for additional information.

Accounts Receivable

We record accounts receivable at net realizable value. Prior to establishing payment terms for a new customer, we evaluate the credit risk of the customer. Credit limits and payment terms established for new customers are re-evaluated periodically based on customer collection experience and other financial factors. At December 31, 2018, single customers comprising more than 10% of our total accounts receivable balance included three customers, which accounted for 45.8% of our total accounts receivable. As of December 31, 2017, single customers comprising more than 10% of our total accounts receivable balance included two customers, which accounted for 63.8% of our total accounts receivable.

We regularly review the need to maintain an allowance for doubtful accounts and consider factors such as the age of accounts receivable balances, the current economic conditions that may affect a customer's ability to pay, significant one-time events and our historical experience. If the financial condition of a customer deteriorates, resulting in an impairment of their ability to make payments, we may be required to record an allowance for doubtful accounts. If circumstances change with regard to individual receivable balances that have previously been determined to be uncollectible (and for which a specific reserve has been established), a reduction in our allowance for doubtful accounts may be required. Our allowance for doubtful accounts was \$0.1 million and zero as of December 31, 2018 and December 31, 2017, respectively.

Other Receivables

Other receivables are comprised primarily of lease receivables, amounts due from subcontract manufacturers for product component transfers, unbilled receivables, investment loan, amounts due from various jurisdictions for value-added tax, and income tax receivable.

Inventory

Inventory is carried at the lower of cost and net realizable value, with cost being determined using the first-in, first-out method. Standard costs for material, labor and manufacturing overhead are used to value inventory. Standard costs are updated at least quarterly; therefore, inventory costs approximate actual costs at the end of each reporting period. We establish reserves for estimated excess, obsolete or unmarketable inventory equal to the difference between the cost of the inventory and the estimated fair value of the inventory based upon assumptions about future demand, market conditions and life. When we dispose of excess and obsolete inventories, the related disposals are charged against the inventory reserve. See Note 7 of Notes to Consolidated Financial Statements for additional information.

Property, Plant and Equipment

Property, plant and equipment, which is stated at cost, is depreciated using the straight-line method over the estimated useful lives of the assets. We depreciate building and land improvements from five to 39 years, office machinery and equipment from three to seven years, engineering machinery and equipment from three to seven years, and computer software from three to five years. Expenditures for repairs and maintenance are charged to expense as incurred. Major improvements that materially prolong the lives of the assets are capitalized. Gains and losses on the disposal of property, plant and equipment are recorded in operating income. See Note 8 of Notes to Consolidated Financial Statements for additional information.

Intangible Assets

Purchased intangible assets with finite lives are carried at cost, less accumulated amortization. Amortization is recorded over the estimated useful lives of the respective assets, which is two to 14 years. See Note 10 of Notes to

Consolidated Financial Statements for additional information.

Impairment of Long-Lived Assets and Intangibles

We review long-lived assets used in operations and intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable and the undiscounted cash flows estimated to be generated by the asset are less than the asset's carrying value. An impairment loss would be recognized in the amount by which the recorded value of the asset exceeds the fair value of the asset, measured by the quoted market price of an asset or an estimate based on the best information available in the circumstances. There were no impairment losses for long-lived assets or intangible assets recognized during the years ended December 31, 2018, 2017 or 2016.

Goodwill

Goodwill represents the excess purchase price over the fair value of net assets acquired. We evaluate the carrying value of goodwill during the fourth quarter of each year and between annual evaluations if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. We have elected to first assess the qualitative factors to determine whether it is more likely than not that the fair value of the reporting unit to which the goodwill is assigned is less than its carrying amount as a basis for determining whether it is necessary to perform the two-step impairment test. If we determine that it is more likely than not that its fair value is less than its carrying amount, then the two-step impairment test will be performed. Based on the results of our qualitative assessment in 2018, we concluded that it was not necessary to perform the two-step impairment test. There were no impairment losses on goodwill recognized during the years ended December 31, 2018, 2017 and 2016.

Liability for Warranty

Our products generally include warranties of 90 days to five years for product defects. We accrue for warranty returns at the time revenue is recognized based on our historical return rate and estimate of the cost to repair or replace the defective products. We engage in extensive product quality programs and processes, including actively monitoring and evaluating the quality of our component suppliers. Our products continue to become more complex in both size and functionality as many of our product offerings migrate from line card applications to total systems. The increasing complexity of our products will cause warranty incidences, when they arise, to be more costly. Our estimates regarding future warranty obligations may change due to product failure rates, material usage, and other rework costs incurred in correcting a product failure. In addition, from time to time, specific warranty accruals may be recorded if unforeseen problems arise. Should our actual experience relative to these factors be worse than our estimates, we will be required to record additional warranty expense. Alternatively, if we provide for more reserves than we require, we will reverse a portion of such provisions in future periods. The liability for warranty obligations totaled \$8.6 million and \$9.7 million as of December 31, 2018 and 2017, respectively. These liabilities are included in accrued expenses in the accompanying consolidated balance sheets. During 2017, we recorded a reduction in warranty expense related to a settlement with a third party supplier for a defective component, the impact of which is reflected in the following table.

A summary of warranty expense and write-off activity for the years ended December 31, 2018, 2017 and 2016 is as follows:

Year Ended December 31, (In thousands)	2018	2017	2016
Balance at beginning of period	\$9,724	\$8,548	\$8,739
Plus: Amounts charged to cost and expenses	7,392	6,951	8,561
Less: Deductions	(8,493)	(5,775)	(8,752)
Balance at end of period	\$8,623	\$9,724	\$8,548
Pension Benefit Plan Obligations			

We maintain a defined benefit pension plan covering employees in certain foreign countries. Pension benefit plan obligations are based on various assumptions used by our actuaries in calculating these amounts. These assumptions include discount rates, compensation rate increases, expected return on plan assets, retirement rates and mortality rates. Actual results that differ from the assumptions and changes in assumptions could affect future expenses and obligations. Our net pension liability totaled \$13.1 million and \$8.3 million at December 31, 2018 and 2017,

respectively. This liability is included in other non-current liabilities in the accompanying consolidated balance sheets.

Stock-Based Compensation

We have two Board and stockholder-approved stock incentive plans from which stock options, performance stock units (PSUs), restricted stock units (RSUs) and restricted stock are available for grant to employees and directors. All employee and director stock options granted under our stock option plans have an exercise price equal to the fair market value of the award, as defined in the plan, of the underlying common stock on the grant date. All of our outstanding stock option awards are classified as equity awards.

Stock-based compensation expense recognized for the years ended December 31, 2018, 2017 and 2016 was approximately \$7.2 million, \$7.4 million and \$6.7 million, respectively. As of December 31, 2018, total compensation cost related to non-vested stock options, PSUs, RSUs and restricted stock not yet recognized was approximately \$18.6 million, which is expected to be recognized over an average remaining recognition period of 2.9 years.

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See Note 4 of Notes to Consolidated Financial Statements for additional information.

Research and Development Costs

Research and development costs include compensation for engineers and support personnel, outside contracted services, depreciation and material costs associated with new product development, enhancement of current products and product cost reductions. We continually evaluate new product opportunities and engage in intensive research and product development efforts. Research and development costs totaled \$124.5 million, \$130.7 million and \$124.9 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Other Comprehensive Income

Other comprehensive income consists of unrealized gains (losses) on available-for-sale debt securities, unrealized gains (losses) on cash flow hedges, reclassification adjustments for amounts included in net income related to impairments of available-for-sale securities, realized gains (losses) on debt securities, realized gains (losses) on cash flow hedges, and amortization of actuarial gains (losses) related to our defined benefit plan, defined benefit plan adjustments, and foreign currency translation adjustments.

The following table presents changes in accumulated other comprehensive income, net of tax, by component for the years ended December 31, 2018, 2017 and 2016:

	Unrealized				Total
	Gains (Losses)	Unrealized	Defined	Foreign	
(In thousands)	on Available- for-Sale Securities	Gains (Losses) on Cash Flow Hedges	Benefit Plan Adjustments	Currency Adjustments	
Balance at December 31, 2015	\$ 1,932	\$ —	\$ (3,895)	\$ (7,006)	\$ (8,969)
Other comprehensive income (loss) before					
reclassifications	1,515	—	(1,229)	(569)	(283)
Amounts reclassified from accumulated other					
comprehensive income	(3,043)	—	107	—	(2,936)
Balance at December 31, 2016	404	—	(5,017)	(7,575)	(12,188)
Other comprehensive income (loss) before					
reclassifications	5,020	(619)	451	5,999	10,851

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Amounts reclassified from accumulated other

comprehensive income	(2,857)	619	280	—	(1,958)
Balance at December 31, 2017	2,567		—	(4,286	)	(1,576	) (3,295
Other comprehensive income (loss) before							
reclassifications	685		—	(3,890	)	(4,236	) (7,441
Amounts reclassified to retained earnings ⁽¹⁾	(3,220	)	—	—	—	(3,220)
Amounts reclassified from accumulated other							
comprehensive income	(595	)	—	135	—	(460)
Balance at December 31, 2018	\$ (563	)	\$ —	\$ (8,041	)	\$ (5,812	) \$(14,416)

⁽¹⁾With the adoption of ASU 2016-01, the unrealized gains on our equity investments were reclassified to retained earnings. See *Recently Issued Accounting Standards* later in Note 1 for more information.

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The following tables present the details of reclassifications out of accumulated other comprehensive income for the years ended December 31, 2018, 2017 and 2016:

(In thousands)	2018	Amount Reclassified	Line Item in the
Details about Accumulated Other Comprehensive	from Accumulated Other	Statement	Where Net Income
Loss Components	Comprehensive Income	Is Presented	
Unrealized gains on available-for-sale securities:			
Net realized gain on sales of securities	\$804		Net investment gain (loss)
Defined benefit plan adjustments – actuarial losses	(196) ⁽¹⁾		
Total reclassifications for the period, before tax	608		
Tax expense	(148)		
Total reclassifications for the period, net of tax	\$460		

⁽¹⁾Included in the computation of net periodic pension cost. See Note 13 of Notes to Consolidated Financial Statements.

(In thousands)	2017	Amount Reclassified	Line Item in the
Details about Accumulated Other Comprehensive	from Accumulated Other	Statement	Where Net Income
Loss Components	Comprehensive Income	Is Presented	
Unrealized gains (losses) on available-for-sale securities:			
Net realized gain on sales of securities	\$4,864		Net investment gain (loss)
Impairment expense	(180)		Net investment gain (loss)
Net losses on derivatives designated as hedging instruments	(897)		Cost of sales
Defined benefit plan adjustments – actuarial losses	(406) ⁽¹⁾		
Total reclassifications for the period, before tax	3,381		
Tax expense	(1,423)		
Total reclassifications for the period, net of tax	\$1,958		

⁽¹⁾Included in the computation of net periodic pension cost. See Note 13 of Notes to Consolidated Financial Statements.

(In thousands)	2016	Amount Reclassified	Line Item in the
Details about Accumulated Other Comprehensive	from Accumulated Other	Statement	Where Net Income
Income Components	Comprehensive Income	Is Presented	

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Unrealized gains (losses) on available-for-sale securities:

Net realized gain on sales of securities	\$5,408	Net investment gain (loss)
Impairment expense	(419)	Net investment gain (loss)
Defined benefit plan adjustments – actuarial losses	(156)	(1)
Total reclassifications for the period, before tax	4,833	
Tax expense	(1,897)	
Total reclassifications for the period, net of tax	\$2,936	

(0)Included in the computation of net periodic pension cost. See Note 13 of Notes to Consolidated Financial Statements.

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The following tables present the tax effects related to the change in each component of other comprehensive income (loss) for the years ended December 31, 2018, 2017 and 2016:

	2018		
	Tax		
	Before-Tax	(Expense)	Net-of-Tax
(In thousands)	Amount	Benefit	Amount
Unrealized gains (losses) on available-for-sale securities	\$926	\$ (241)	\$ 685
Reclassification adjustment for amounts related to available-for-sale investments included in net loss	(804)	209	(595)
Reclassification adjustment for amounts reclassified to retained earnings related to the adoption of ASU 2016-01	(4,351)	1,131	(3,220)
Defined benefit plan adjustments	(5,638)	1,748	(3,890)
Reclassification adjustment for amounts related to defined benefit plan adjustments included in net loss	196	(61)	135
Foreign currency translation adjustment	(4,236)	—	(4,236)
Total Other Comprehensive Income (Loss)	\$(13,907)	\$ 2,786	\$ (11,121)

	2017		
	Tax		
	Before-Tax	(Expense)	Net-of-Tax
(In thousands)	Amount	Benefit	Amount
Unrealized gains (losses) on available-for-sale securities	\$8,230	\$ (3,210)	\$ 5,020
Reclassification adjustment for amounts related to available-for-sale investments included in net income	(4,684)	1,827	(2,857)
Unrealized gains (losses) on cash flow hedges	(897)	278	(619)
Reclassification adjustment for amounts related to cash flow hedges included in net income	897	(278)	619
Defined benefit plan adjustments	654	(203)	451
Reclassification adjustment for amounts related to defined benefit plan adjustments included in net income	406	(126)	280
Foreign currency translation adjustment	5,999	—	5,999
Total Other Comprehensive Income (Loss)	\$10,605	\$ (1,712)	\$ 8,893

	2016		
	Tax		
	Before-Tax	(Expense)	Net-of-Tax
(In thousands)	Amount	Benefit	Amount
Unrealized gains (losses) on available-for-sale securities	\$2,484	\$ (969)	\$ 1,515

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Reclassification adjustment for amounts related to available-for-sale investments included in net income	(4,989)	1,946	(3,043)
Defined benefit plan adjustments	(1,782)	553	(1,229)
Reclassification adjustment for amounts related to defined benefit plan adjustments included in net income	156	(49)	107
Foreign currency translation adjustment	(569)	—	(569)
Total Other Comprehensive Income (Loss)	\$ (4,700)	\$ 1,481	\$ (3,219)

Income Taxes

The provision for income taxes has been determined using the asset and liability approach of accounting for income taxes. Under this approach, deferred taxes represent the future tax consequences expected to occur when the reported amounts of assets and liabilities are recovered or paid. The provision for income taxes represents income taxes paid or payable for the current year plus the change in deferred taxes during the year. Deferred taxes result from the difference between financial and tax bases of our assets and liabilities and are adjusted for changes in tax rates and tax laws when such changes are enacted. Valuation allowances are recorded to reduce deferred tax assets when it is more likely than not that a tax benefit will not be realized.

We establish reserves to remove some or all of the tax benefit of any of our tax positions at the time we determine that the positions become uncertain. We adjust these reserves, including any impact on the related interest and penalties, as facts and circumstances change.

Foreign Currency

We record transactions denominated in foreign currencies on a monthly basis using exchange rates from throughout the year. Assets and liabilities denominated in foreign currencies are remeasured at the balance sheet dates using the closing rates of exchange between those foreign currencies and the functional currency with any transaction gains or losses reported in other income (expense). Our primary exposures to foreign currency exchange rate movements are with our German subsidiary, whose functional currency is the Euro, our Australian subsidiary, whose functional currency is the Australian dollar, and our Mexican subsidiary, whose functional currency is the U.S. dollar. Adjustments resulting from translating financial statements of international subsidiaries are recorded as a component of accumulated other comprehensive income (loss).

Revenue Recognition

On January 1, 2018 we adopted ASU 2014-09, *Revenue from Contracts with Customers (Topic 606)*, which supersedes the revenue recognition requirements in Topic 605, *Revenue Recognition*.

Accounting Policy under Topic 606

Revenue is measured based on the consideration we expect to receive in exchange for transferring goods or providing services to a customer and as performance obligations under the terms of the contract are satisfied. For transactions where there are multiple performance obligations, we account for individual products and services separately if they are distinct (if a product or service is separately identifiable from other items and if a customer can benefit from it on its own or with other resources that are readily available to the customer). The consideration, including any discounts, is allocated between separate products and services based on their stand-alone selling prices. Shipping fees are recorded as revenue and the related cost is included in cost of sales. Sales, value-added, and other taxes collected

concurrently with revenue-producing activities are excluded from revenue. Costs of obtaining a contract are capitalized and amortized over the period that the related revenue is recognized if greater than one year. We have elected to apply the practical expedient related to the incremental costs of obtaining contracts and recognize those costs as an expense when incurred if the amortization period of the assets is one year or less. These costs are included in selling, general, and administrative expenses. Capitalized costs with an amortization period greater than one year were immaterial.

A portion of our products is sold to a non-exclusive distribution network of major technology distributors in the United States. These large organizations then distribute or provide fulfillment services to an extensive network of VARs and Sis. VARs and Sis may be affiliated with us as a channel partner, or they may purchase from the distributor in an unaffiliated fashion. Additionally, with certain limitations our distributors may return unused and unopened product for stock-balancing purposes when such returns are accompanied by offsetting orders for products of equal or greater value.

We participate in cooperative advertising and market development programs with certain customers. We use these programs to reimburse customers for certain forms of advertising, and in general, to allow our customers credits up to a specified percentage of their net purchases. Our costs associated with these programs are estimated and included in marketing expenses in our consolidated statements of income. We also participate in rebate programs to provide sales incentives for certain products. Our costs associated with these programs are estimated and accrued at the time of sale, and are recorded as a reduction of sales in our consolidated statements of income.

Accounting Policy under Topic 605

Revenue was generally recognized when persuasive evidence of an arrangement exists, delivery has occurred, the product price was fixed or determinable, collection of the resulting receivable was reasonably assured, and product returns were reasonably estimable. For product sales, revenue was generally recognized upon shipment of the product to our customer in accordance with the title transfer terms of the sales agreement, generally Ex Works, per International Commercial Terms. In the case of consigned inventory, revenue was recognized when the end customer assumes ownership of the product. Contracts that contained multiple deliverables were evaluated to determine the units of accounting, and the consideration from the arrangement was allocated to each unit of accounting based on the relative selling price and corresponding terms of the contract. When this was not available, we were generally not able to determine third-party evidence of selling price because of the extent of customization among competing products or services from other companies. In these instances, we used best estimates to allocate consideration to each respective unit of accounting. These estimates included analysis of respective bills of material and review and analysis of similar product and service offerings. We recorded revenue associated with installation services when respective contractual obligations are complete. In instances where customer acceptance was required, revenue was deferred until respective acceptance criteria were met. Contracts that included both installation services and product sales were evaluated for revenue recognition in accordance with contract terms. As a result, installation services may have been considered a separate deliverable or may have been considered a combined single unit of accounting with the delivered product. Generally, either the purchaser, ADTRAN, or a third party would perform the installation of our products. Shipping fees were recorded as revenue and the related costs were included in cost of sales. Sales taxes invoiced to customers were included in revenues, and represented less than one percent of total revenues. The corresponding sales taxes paid were included in cost of goods sold. Value-added taxes collected from customers in international jurisdictions were recorded in accrued expenses as a liability. Revenue was recorded net of discounts. Sales returns were recorded as a reduction of revenue and accrued based on historical sales return experience, which we believed provided a reasonable estimate of future returns.

Unearned Revenue

Unearned revenue primarily represents customer billings on our maintenance service programs and leases and unearned revenues related to multiple element contracts where we still have contractual obligations to our customers. We currently offer maintenance contracts ranging from one month to five years. Revenue attributable to maintenance contracts is recognized on a straight-line basis over the related contract term. In addition, we provide software maintenance and a variety of hardware maintenance services to customers under contracts with terms up to ten years. When we defer revenue related to multiple-element contracts where we still have contractual obligations, we also defer the related costs. Current deferred costs are included in prepaid expenses and other assets and totaled \$2.4 million and \$11.4 million as of December 31, 2018 and 2017, respectively. Non-current deferred costs are included in other assets and totaled \$0.8 million and \$2.8 million as of December 31, 2018 and 2017, respectively.

Other Income (Expense), Net

Other income (expense), net, is comprised primarily of gains and losses on foreign currency transactions, net periodic pension costs, scrap raw material sales, investment account management fees, gains and losses on foreign exchange forward contracts and miscellaneous income and expense.

Earnings (Loss) per Share

Earnings (loss) per common share and earnings (loss) per common share assuming dilution, are based on the weighted average number of common shares and, when dilutive, common equivalent shares outstanding during the year. See Note 16 of Notes to Consolidated Financial Statements for additional information.

Dividends

During 2018, 2017 and 2016, we paid shareholder dividends totaling \$17.3 million, \$17.4 million and \$17.6 million, respectively. The Board of Directors presently anticipates that it will declare a regular quarterly dividend so long as the present tax treatment of dividends exists and adequate levels of liquidity are maintained. The following table shows dividends paid to our shareholders in each quarter of 2018, 2017 and 2016.

Dividends per Common Share

	2018	2017	2016
First Quarter	\$0.09	\$0.09	\$0.09
Second Quarter	\$0.09	\$0.09	\$0.09
Third Quarter	\$0.09	\$0.09	\$0.09
Fourth Quarter	\$0.09	\$0.09	\$0.09

On January 23, 2019, the Board of Directors declared a quarterly cash dividend of \$0.09 per common share to be paid to shareholders of record at the close of business on February 7, 2019. The ex-dividend date was February 6, 2019 and the payment date was February 21, 2019. The quarterly dividend payment was \$4.3 million.

Business Combinations

The Company records assets acquired, liabilities assumed, contractual contingencies, when applicable, and intangible assets recognized as part of business combinations based on their fair values on the date of acquisition. The excess of the purchase price over the estimated fair values of the net tangible and intangible assets acquired is recorded as goodwill. If the estimated fair values of net tangible and intangible assets acquired exceed the purchase price, a bargain purchase gain is recorded. The Company's estimates of fair value are based on historical experience, industry knowledge, certain information obtained from the management of the acquired company and, in some cases, valuations performed by independent third-party firms. The results of operations of acquired companies are included in the accompanying condensed consolidated statements of operations since their dates of acquisition. Costs incurred to complete the business combination, such as legal, accounting, or other professional fees, are charged to general and administrative expenses as they are incurred.

Recently Issued Accounting Standards

In February 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2016-02, *Leases (Topic 842)*. ASU 2016-02 requires an entity to recognize right-of-use assets and lease liabilities on the balance sheet and to disclose key information about the entity's leasing arrangements. In July 2018, the FASB issued ASU 2018-10, *Codification Improvements to Topic 842, Leases*, which clarified certain aspects of ASU 2016-02, as well as, ASU 2018-11, *Leases (Topic 842), Targeted Improvements*, which provides for an optional transition method that allows for the application of the legacy lease guidance, including its disclosure requirements, for the comparative periods presented in the year of adoption, with the cumulative effect of initially applying the new lease standard recognized as an adjustment to retained earnings as of the date of adoption. For lessors, the new leasing standard requires leases to be classified as a sales-type, direct financing or operating leases. These criteria focus on the transfer of control of the underlying lease asset. This standard and related updates are effective for fiscal years beginning after December 15, 2018, and interim periods within those fiscal years.

The Company adopted the new standard on January 1, 2019, the effective date of our initial application, using the optional transition method. The Company will not adjust the comparative period financial information prior to January 1, 2019 and will carry forward the legacy (ASC 840) disclosures for comparative periods. In addition, the Company elected the package of practical expedients which allows for companies to not reassess historical lease classifications and initial direct costs for existing leases. Additionally, the Company elected the practical expedients which allow the use of hindsight when determining the lease term, the short-term lease recognition exemption and the option to not separate lease and non-lease components. The adoption of this standard resulted in the recognition of a right-of-use asset and corresponding right-of-use liability on our consolidated balance sheet of less than 3% of total assets, mainly related to our operating leases for office space. The adoption of this standard did not have a material impact on our consolidated statement of income or statement of cash flow.

The adoption of this standard from a lessor perspective did not have a material impact on the Company's consolidated balance sheet, consolidated statement of income or statement of cash flow. Prior to adoption, all of our leases in which we are the lessor were classified as sales-types leases and will continue after adoption of the new standard.

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments – Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*. ASU 2016-13 requires the measurement and recognition of expected credit losses for financial instruments held at amortized cost. In November 2018, the FASB issued ASU 2018-19, *Codification Improvements to Topic 326 Financial Instruments – Credit Losses*, that clarifies receivables arising from operating leases are not within the scope of the credit losses standard, but rather, should be accounted for in accordance with the leases standard. ASU 2016-13 and ASU 2018-19 are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019, with early adoption permitted. We are currently evaluating the effect ASU 2016-13 and ASU 2018-19 will have on our consolidated financial statements.

In January 2017, the FASB issued ASU 2017-04, *Intangibles – Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment*. ASU 2017-04 simplifies the measurement of goodwill by eliminating step 2 of the goodwill impairment test. Under ASU 2017-04, entities will be required to compare the fair value of a reporting unit to its carrying amount and recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value. ASU 2017-04 is effective for annual or interim impairment tests performed in fiscal years beginning after December 15, 2019, with early adoption permitted for annual or interim impairment tests performed on testing dates after January 1, 2017. The amendments should be applied prospectively. We are currently evaluating whether to early adopt ASU 2017-04, but we do not expect it will have a material effect on our consolidated financial statements.

In March 2017, the FASB issued ASU 2017-08, *Receivables – Nonrefundable Fees and Other Costs (Subtopic 310-20): Premium Amortization on Purchased Callable Debt Securities*, which shortens the amortization period for the premium on certain purchased callable debt securities to the earliest call date. ASU 2017-08 is effective for fiscal years and interim periods within those fiscal years, beginning after December 15, 2018 with early adoption permitted. The amendments should be applied through a modified-retrospective transition approach that requires a cumulative-effect adjustment directly to retained earnings as of the beginning of the period of adoption. The Company adopted ASU 2017-08 on January 1, 2019 and the adoption of this standard did not have a material impact on our consolidated financial statements.

In August 2017, the FASB issued ASU 2017-12, *Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities*. ASU 2017-12 expands and refines hedge accounting for both financial and non-financial risk components, aligns the recognition and presentation of the effects of hedging instruments and hedge items in the financial statements, and includes certain targeted improvements to ease the application of current guidance related to the assessment of hedge effectiveness. ASU 2017-12 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted. The Company adopted ASU 2017-12 on January 1, 2019 and the adoption of this standard did not have a material impact on our consolidated financial statements as we currently do not have any hedging instruments.

In February 2018, the FASB issued ASU 2018-02, *Income Statement – Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Comprehensive Income*. ASU 2018-02 allows for an optional reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act of 2017. ASU 2018-02 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018, with early adoption permitted. The Company adopted ASU 2018-02 on January 1, 2019, and upon adoption elected to reclassify the stranded tax effects related to the Tax Cuts and Jobs Act of 2017 to retained earnings.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820) Disclosure Framework-Changes to the Disclosure Requirements for Fair Value Measurement*, which changes the fair value measurement disclosure requirements of ASC 820, *Fair Value Measurement*. The amendments in this ASU are the result of a broader disclosure project called, *Concepts Statement No. 8 - Conceptual Framework for Financial*

Reporting — Chapter 8, Notes to Financial Statements, which the FASB finalized on August 28, 2018. The FASB used the guidance in the Concepts Statement to improve the effectiveness of ASC 820's disclosure requirements. ASU 2018-13 provides users of financial statements with information about assets and liabilities measured at fair value in the statement of financial position or disclosed in the notes to the financial statements. More specifically ASU 2018-13 requires disclosures about the valuation techniques and inputs that are used to arrive at measures of fair value, including judgments and assumptions that are made in determining fair value. In addition, ASU 2018-13 requires disclosures regarding the uncertainty in the fair value measurements as of the reporting date and how changes in fair value measurements affect performance and cash flows. ASU 2018-13 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. We are currently evaluating the effect of ASU 2018-13, but we do not expect it will have a material effect on our financial statement disclosures.

In August 2018, the FASB issued ASU 2018-14, *Compensation-Retirement Benefits-Defined Benefit Plans-General (Subtopic 715-20): Disclosure Framework-Changes to the Disclosure Requirements for Defined Benefit Plans*, which makes changes to and clarifies the disclosure requirements related to defined benefit pension and other postretirement plans. ASU 2018-14 requires additional disclosures related to the reasons for significant gains and losses affecting the benefit obligation and an explanation of any other significant changes in the benefit obligation or plan assets that are not otherwise apparent in other disclosures required by ASC 715. ASU 2018-14 also clarifies the guidance in ASC 715 to require disclosure of the projected benefit obligation (PBO) and fair value of plan assets for pension plans with PBOs in excess of plan assets and the accumulated benefit obligation (ABO) and fair value of plan assets for pension plans with ABOs in excess of plan assets. ASU 2018-14 is effective for public business entities for fiscal years ending after December 15, 2020. We are currently evaluating the effect of ASU 2018-14, but we do not expect it will have a material effect on our financial statement disclosures.

In August 2018, the FASB issued ASU 2018-15, *Intangibles-Goodwill and Other-Internal-Use Software (Subtopic 350-40), Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract*. ASU 2018-15 clarifies certain aspects of ASU 2015-05, *Customer's Accounting for Fees Paid in a Cloud Computing Arrangement*. Specifically, ASU 2018-15 aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementations costs incurred to develop or obtain internal use software. ASU 2018-15 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019, with early adoption permitted. We are currently evaluating whether to early adopt, but we do not expect it will have a material effect on our consolidated financial statements.

During 2018, we adopted the following accounting standards, which had no material effect on our financial position, results of operations or cash flows:

In May 2014, the FASB issued ASU 2014-09, *Revenue from Contracts with Customers (Topic 606)*, which supersedes the revenue recognition requirements in Topic 605, *Revenue Recognition*, including most industry-specific revenue recognition guidance throughout the Industry Topics of the Codification. The core principle of ASU 2014-09 is to recognize revenues when promised goods or services are transferred to customers in an amount that reflects the consideration that is expected to be received for those goods or services. In August 2015, the FASB issued ASU 2015-14, which deferred the effective date of ASU 2014-09 to fiscal years beginning after December 31, 2017, and interim periods within those fiscal years, with early adoption permitted for reporting periods beginning after December 15, 2016. Subsequently, the FASB issued ASUs in 2016 containing implementation guidance related to ASU 2014-09, including: ASU 2016-08, *Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations (Reporting Revenue Gross versus Net)*, which is intended to improve the operability and understandability of the implementation guidance on principal versus agent considerations; ASU 2016-10, *Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing*, which is intended to clarify two aspects of Topic 606: identifying performance obligations and the licensing implementation guidance; ASU 2016-12, *Revenue from Contracts with Customers (Topic 606): Narrow-Scope Improvements and Practical Expedients*, which contains certain provisions and practical expedients in response to identified implementation issues; and ASU 2016-20, *Technical Corrections and Improvements to Topic 606, Revenue from Contracts with Customers*, which is intended to clarify the Codification and/or to correct unintended application of guidance. ASU 2014-09 allows for either full retrospective or modified retrospective adoption. We adopted ASU 2014-09 and the related ASUs on January 1, 2018 using the modified retrospective method, which was applied to all contracts on the date of initial adoption.

These ASUs primarily affected our network implementation service revenue performance obligations and contract costs. We are using the "output method" to measure network implementation services progress, which 1) accelerates revenue recognition for certain performance obligations related to service revenue arrangements that were previously

deferred until customer acceptance and 2) requires capitalization and amortization of the incremental costs of obtaining a contract as described below.

In connection with the adoption of the new revenue standard, effective January 1, 2018, we adopted ASC 340-40, *Other Assets and Deferred Costs – Contracts with Customers*, with respect to capitalization and amortization of incremental costs of obtaining a contract. As a result, certain costs of obtaining a contract, including sales commissions, will be capitalized, as the guidance requires the capitalization of all incremental costs incurred to obtain a contract with a customer that it would not have incurred if the contract had not been obtained, provided the costs are recoverable. The primary effect was the capitalization of certain sales commissions for our extended maintenance and support contracts in excess of one year and amortization of those costs over the period that the related revenue is recognized. Those costs that will be amortized within the next 12 months are included in prepaid expenses and other current assets and those costs that will be amortized after the next 12 months are included in other assets on the consolidated balance sheets.

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The cumulative effect of the changes made to our Consolidated Balance Sheet on January 1, 2018 for the adoption of ASU 2014-09 and the related ASUs was as follows:

	Balance at		Balance at	
(In thousands)	December 31, 2017	Adjustments due to ASU 2014-09	January 1, 2018	
Other receivables	\$ 26,578	\$ 374	\$ 26,952	
Deferred tax assets, net	\$ 23,428	\$ (96)	\$ 23,332	
Retained earnings	\$ 922,178	\$ 278	\$ 922,456	

The effect of the adoption of ASU 2014-09 and the related ASUs on our financial statements was as follows:

	As of December 31, 2018		
(In thousands)	As Reported	Balances Without Adoption of ASC 606	Effect of Adoption of ASC 606
Sales			
Products	\$458,232	\$458,182	\$ 50
Services	\$71,045	\$67,329	\$ 3,716
Cost of Sales			
Products	\$278,929	\$278,904	\$ 25
Services	\$46,783	\$44,788	\$ 1,995
Loss before benefit for income taxes	\$(33,371)	\$(35,117)	\$ 1,746
Benefit for income taxes	\$14,029	\$14,763	\$ (734)
Net loss	\$(19,342)	\$(20,354)	\$ 1,012

	As of December 31, 2018		
(In thousands)	As Reported	Balances Without Adoption of ASC 606	Effect of Adoption of ASC 606
Assets			
Other receivables	\$36,699	\$32,933	\$ 3,766
Prepaid expenses and other current assets	\$10,744	\$12,739	\$ (1,995)
Inventory	\$99,848	\$99,873	\$ (25)
Liabilities			
Income tax payable	\$12,518	\$13,252	\$ (734)
Equity			
Retained earnings	\$883,975	\$882,963	\$ 1,012

In January 2016, the FASB issued ASU 2016-01, *Financial Instruments — Overall: Recognition and Measurement of Financial Assets and Financial Liabilities*, which addresses certain aspects of the recognition, measurement, presentation and disclosure of financial instruments. Subsequently, the FASB issued ASU 2018-03, *Technical Corrections and Improvements to Financial Instruments – Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*, which issued technical corrections and improvements intended to clarify certain aspects of ASU 2016-01. ASU 2016-01 was effective beginning January 1, 2018 and we now recognize any changes in the fair value of certain equity investments in net income as prescribed by the new standard rather than in other comprehensive income. We adopted ASU 2016-01 on January 1, 2018 using the modified retrospective method, which resulted in a \$3.2 million reclassification of net unrealized gains from accumulated other comprehensive income to opening retained earnings. ASU 2018-03 is effective for us with the interim period beginning after June 15, 2018.

In March 2017, the FASB issued ASU 2017-07, *Compensation – Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost*. ASU 2017-07 amends ASC 715, *Compensation — Retirement Benefits*, to require employers that present a measure of operating income in their statements of earnings to include only the service cost component of net periodic pension cost and net periodic postretirement benefit cost in operating expenses (together with other employee compensation costs). The other components of net benefit cost, including amortization of prior service cost/credit, and settlement and curtailment effects, are to be included in non-operating expenses. We adopted ASU 2017-07 on January 1, 2018. We retrospectively adopted the presentation of service cost separate from other components of net periodic pension costs. As a result, \$0.4 million and \$0.2 million have been reclassified from cost of sales, selling, general and administrative expenses, and research and development expense to other income (expense), net for the years ended December 31, 2017 and 2016, respectively.

Note 2 – Business Combinations

On November 30, 2018, we acquired SmartRG, Inc., a provider of carrier-class, open-source connected home platforms and cloud services for broadband service providers for cash consideration. Together, ADTRAN Mosaic and SmartOS provide full end-to-end management and orchestration solutions from cloud edge to subscriber edge. This transaction was accounted for as a business combination. We have included the financial results of this acquisition in our consolidated financial statements since the date of acquisition. These revenues are included in the Subscriber Solutions & Experience category within the Network Solutions and Services & Support reportable segments.

As of the acquisition date, we acquired accounts receivables with a fair value of \$4.9 million all of which we estimate will be collected under the respective terms of each agreement.

Contingent liabilities with a fair value totaling \$1.2 million were recognized at the acquisition date, the payments of which are dependent upon SmartRG achieving future revenue, EBIT or customer purchase order milestones. The contingent payments are subject to arbitration and the final payouts are expected to occur during the first quarter of 2020. The minimum and maximum potential payment under the total of the contingent liabilities ranges from no payment to \$1.5 million. As of December 31, 2018, the fair value of the contingent liability was re-assessed and was determined to be \$1.2 million, based on the expected probable outcomes. No change in fair value was recognized.

An escrow in the amount of \$2.8 million was set up at the acquisition date, to fund post-closing working capital settlements and to indemnify the Company from any inaccuracy or breach of representations, warranties, covenants, agreements or obligations of the sellers. The escrow is subject to arbitration with final settlement expected during the fourth quarter of 2020. The minimum and maximum potential release of funds to the seller ranges from no payment to \$2.8 million.

We have made preliminary allocations of the purchase price to the assets acquired and liabilities assumed based on estimated fair value assessments; however, we are still completing those assessments, including an analysis of the discounted cash flows. Once we finalize the fair values, we may have changes in the following areas: tangible and intangible assets, goodwill, commitments and contingencies, and deferred taxes. We recorded goodwill of \$3.6 million during the year ended December 31, 2018. Goodwill represents the excess of the purchase price over the fair value of net assets acquired. We have assessed the recognition and measurement of the assets acquired and liabilities assumed based on historical and forecasted data for future periods and we have concluded that our valuation procedures and resulting measures were appropriate.

On March 19, 2018, we acquired Sumitomo Electric Lightwave Corp.'s (SEL) North American EPON business and entered into a technology license and OEM supply agreement with Sumitomo Electric Industries, Ltd. (SEI). This acquisition establishes ADTRAN as a North American market leader for EPON solutions for the cable MSO industry

and it will accelerate the MSO market's adoption of our open, programmable and scalable architectures. This transaction was accounted for as a business combination. We have included the financial results of this acquisition in our consolidated financial statements since the date of acquisition. These revenues are included in the Access & Aggregation and Subscriber Solutions & Experience categories within the Network Solutions reportable segment.

We recorded a bargain purchase gain of \$11.3 million during the first quarter of 2018, net of income taxes, which is subject to customary working capital adjustments between the parties. The bargain purchase gain of \$11.3 million represents the difference between the fair-value of the net assets acquired over the cash paid. SEI, an OEM supplier based in Japan, is the global market leader in EPON. SEI's Broadband Networks Division, through its SEL subsidiary, operated a North American EPON business that included sales, marketing, support, and region-specific engineering development. The North American EPON market is primarily driven by the Tier 1 cable MSO operators and has developed more slowly than anticipated. Through the transaction, SEI divested its North American EPON assets and established a relationship with ADTRAN. The transfer of these assets to ADTRAN, which included key customer relationships and a required assumption by ADTRAN of relatively low incremental expenses, along with the value of the technology license and OEM supply agreement, resulted in the bargain purchase gain. We have assessed the recognition and measurement of the assets acquired and liabilities assumed based on historical and forecasted data for future periods and we have concluded that our valuation procedures and resulting measures were appropriate. The gain is included in the line item "Gain on bargain purchase of a business" in the 2018 Consolidated Statements of Income.

The preliminary allocation of the purchase price to the estimated fair value of the assets acquired and liabilities assumed at the acquisition date for SmartRG and the final allocation of the purchase price to the estimated fair value of the assets acquired and liabilities assumed at the acquisition date for Sumitomo are as follows:

(In Thousands)	Sumitomo	SmartRG
Assets		
Tangible assets acquired	\$ 1,006	\$ 8,594
Intangible assets	22,100	9,960
Goodwill	—	3,614
Total assets acquired	23,106	22,168
Liabilities		
Liabilities assumed	(3,978)	(6,126)
Total liabilities assumed	(3,978)	(6,126)
Total net assets	19,128	16,042
Gain on bargain purchase of a business, net of tax	(11,322)	—
Total purchase price	\$ 7,806	\$ 16,042

Our consolidated income statements include the following revenue and net loss attributable to SmartRG and Sumitomo since the date of acquisition:

(In thousands) March
19, 2018
to

December
31,

	2018
Revenue	\$ 9,186
Net loss	\$ (1,297)

The details of the acquired intangible assets are as follows:

<i>(In thousands)</i>	Value	Life (years)
Customer relationships	\$ 15,190	3 – 12
Developed technology	7,400	7
Licensed technology	5,900	9
Supplier relationship	2,800	2
Licensing agreements	560	5 – 10
Trade name	210	3
Total	\$ 32,060	

The following unaudited supplemental pro forma information presents the financial results as if the acquisition of SmartRG and Sumitomo had occurred on January 1, 2017. This unaudited supplemental pro forma information does not purport to be indicative of what would have occurred had the acquisition been completed on January 1, 2017, nor is it indicative of any future results. Aside from revising the 2017 net income for the effect of the bargain purchase gains, there were no material, non-recurring adjustments to this unaudited pro forma information.

(In thousands)	2018	2017
Pro forma revenue	\$559,050	\$702,573
Pro forma net income (loss)	\$(33,862)	\$33,206
Pro forma earnings (loss) per share – basic	\$(0.71)	\$0.69
Pro forma earnings (loss) per share – diluted	\$(0.71)	\$0.68

For the year ended December 31, 2018, we incurred acquisition and integration related expenses and amortization of acquired intangibles related to these acquisitions of \$2.9 million.

Note 3 - Revenue

Revenue is measured based on the consideration we expect to receive in exchange for transferring goods or providing services to a customer and as performance obligations under the terms of the contract are satisfied. Generally, this occurs with the transfer of control of a product or service to the customer. For transactions where there are multiple performance obligations, we account for individual products and services separately if they are distinct (if a product or service is separately identifiable from other items and if a customer can benefit from it on its own or with other resources that are readily available to the customer). The consideration, including any discounts, is allocated between separate products and services based on their stand-alone selling prices. The stand-alone selling prices are determined based on the prices at which we sell the separate products and services and are allocated based on each item's relative value to the total value of the products and services in the arrangement. For items that are not sold separately, we estimate stand-alone selling prices primarily using the "expected cost plus a margin" approach. Payment terms are generally 30 days in the U.S. and typically longer in many geographic markets outside the U.S. Shipping fees are recorded as revenue and the related cost is included in cost of sales. Sales, value-added, and other taxes collected concurrently with revenue-producing activities are excluded from revenue. Costs of obtaining a contract are capitalized and amortized over the period that the related revenue is recognized if greater than one year. We have elected to apply the practical expedient related to the incremental costs of obtaining contracts and recognize those costs as an expense when incurred if the amortization period of the assets is one year or less. These costs are included in selling, general and administrative expenses. Capitalized costs with an amortization period greater than one year were immaterial.

The following is a description of the principal activities from which we generate our revenue by reportable segment.

Network Solutions Segment

Network Solutions includes hardware products and software defined next-generation virtualized solutions used in service provider or business networks, as well as prior generation products. The majority of the revenue from this segment is from hardware sales.

Hardware and Software Revenue

Revenue from hardware sales is recognized when control is transferred to our customers, which is generally when we ship the products. Shipping terms are generally FOB shipping point. This segment also includes revenues from software license sales which is recognized at delivery and transfer of control to the customer. Revenue is recorded net of estimated discounts and rebates using historical trends. Customers are typically invoiced when control is transferred and revenue is recognized. Our products generally include assurance-based warranties of 90 days to five years for product defects, which are accrued at the time revenue is recognized.

In certain transactions, we are also the lessor in sales-type lease arrangements for network equipment that have terms of 18 months to five years. These arrangements typically include network equipment, network implementation services and maintenance services. Product revenue for these leases is generally recorded when we transfer control of the product to our customers. Revenue for network implementation and maintenance services is recognized as described below. Customers are typically invoiced and pay in equal installments over the lease term. In relation to these lease agreements, during the years ended December 31, 2018, 2017 and 2016 we recognized revenue of \$13.7 million, \$16.5 million and \$2.7 million, respectively.

Services & Support Segment

To complement our Network Solutions segment, we offer a complete portfolio of maintenance, network implementation, and solutions integration and managed services, which include hosted cloud services and subscription services.

Maintenance Revenue

Our maintenance service periods range from one month to five years. Customers are typically invoiced and pay for maintenance services at the beginning of the maintenance period. We recognize revenue for maintenance services on a straight-line basis over the maintenance period in services revenue as our customers benefit evenly throughout the contract term and deferred revenues are recorded in current and non-current unearned revenue.

Network Implementation Revenue

We recognize revenue for network implementation, which primarily consists of engineering, execution, and enablement services, at a point in time when each performance obligation is complete. If we have recognized revenue, but have not billed the customer, the right to consideration is recognized as a contract asset that is included in other receivables in the Consolidated Balance Sheet. The contract asset is transferred to accounts receivable when the completed performance obligation is invoiced to the customer.

As of December 31, 2018, we did not have any significant performance obligations related to customer contracts that had an original expected duration of one year or more, other than maintenance services, which are satisfied over time.

The following table provides information about receivables, contract assets and unearned revenue from contracts with customers:

(In thousands)	December 31, January	
	2018	1, 2018
Accounts receivable	\$ 99,385	\$144,150
Contract assets	\$ 3,766	\$374
Unearned revenue	\$ 17,940	\$13,070
Non-current unearned revenue	\$ 5,296	\$4,556

The decrease in accounts receivable is due to the collection of customer-specific payment terms that became due in the first quarter of 2018. The increase in the contract asset balance for the year ended December 31, 2018 is primarily attributable to revenue recognized that has not yet been billed to the customer during the period. The increase in the unearned revenue balance as of the year ended December 31, 2018 is primarily attributable to cash payments received or due in advance of satisfying our performance obligations, offset by \$9.9 million of revenues recognized that were included in the unearned revenue balance as of December 31, 2017.

The following table disaggregates our revenue by major source for the year ended December 31, 2018.

(In thousands)	Services		
	Network Solutions	& Support	Total
Access & Aggregation	\$ 301,801	\$ 57,069	\$ 358,870
Subscriber Solutions & Experience ⁽¹⁾	129,067	5,393	134,460
Traditional & Other Products	27,364	8,583	35,947
Total	\$ 458,232	\$ 71,045	\$ 529,277

(1) Subscriber Solutions & Experience was formerly reported as Customer Devices. With the increasing focus on enhancing the customer experience for both our business and consumer broadband customers and the addition of SmartRG during the fourth quarter of 2018, Subscriber Solutions & Experience more accurately represents this revenue category.

Note 4 – Stock-Based Compensation

Stock Incentive Program Descriptions

On January 23, 2006, the Board of Directors adopted the ADTRAN, Inc. 2006 Employee Stock Incentive Plan (2006 Plan), which authorized 13.0 million shares of common stock for issuance to certain employees and officers through incentive stock options and non-qualified stock options, stock appreciation rights, RSUs, and restricted stock. The 2006 Plan was adopted by stockholder approval at our annual meeting of stockholders held on May 9, 2006. Options granted under the 2006 Plan typically become exercisable beginning after one year of continued employment, normally pursuant to a four-year vesting schedule beginning on the first anniversary of the grant date, and have a ten-year contractual term. The 2006 Plan was replaced on May 13, 2015 by the ADTRAN, Inc. 2015 Employee Stock Incentive Plan (2015 Plan). Expiration dates of options outstanding as of December 31, 2018 under the 2006 Plan range from 2019 to 2024.

On January 20, 2015, the Board of Directors adopted the ADTRAN, Inc. 2015 Employee Stock Incentive Plan (2015 Plan), which authorized 7.7 million shares of common stock for issuance to certain employees and officers through incentive stock options and non-qualified stock options, stock appreciation rights, PSUs, RSUs, and restricted stock. The 2015 Plan was adopted by stockholder approval at our annual meeting of stockholders held on May 13, 2015. PSUs, RSUs, and restricted stock granted under the 2015 Plan reduce the shares authorized for issuance under the 2015 Plan by 2.5 shares of common stock for each share underlying the award. Options granted under the 2015 Plan typically become exercisable beginning after one year of continued employment, normally pursuant to a four-year vesting schedule beginning on the first anniversary of the grant date, and have a ten-year contractual term. Expiration dates of options outstanding as of December 31, 2018 under the 2015 Plan range from 2025 to 2026.

Our stockholders approved the 2010 Directors Stock Plan (2010 Directors Plan) on May 5, 2010, under which 0.5 million shares of common stock have been reserved. This plan replaces the 2005 Directors Stock Option Plan. Under the 2010 Directors Plan, the Company may issue stock options, restricted stock and RSUs to our non-employee directors. Stock awards issued under the 2010 Directors Plan normally become vested in full on the first anniversary of the grant date. Options issued under the 2010 Directors Plan have a ten-year contractual term. All remaining options outstanding as of December 31, 2018 under the 2010 Directors Plan will expire in 2019.

The following table summarizes stock-based compensation expense related to stock options, PSUs, RSUs and restricted stock for the years ended December 31, 2018, 2017 and 2016, which was recognized as follows:

(In thousands)	2018	2017	2016
Stock-based compensation expense included in cost of sales	\$418	\$379	\$389
Selling, general and administrative expense	3,989	4,063	3,341
Research and development expense	2,748	2,991	2,965
Stock-based compensation expense included in operating expenses	6,737	7,054	6,306
Total stock-based compensation expense	7,155	7,433	6,695
Tax benefit for expense associated with non-qualified options, PSUs, RSUs and restricted stock	(1,432)	(1,699)	(963)
Total stock-based compensation expense, net of tax	\$5,723	\$5,734	\$5,732

With our adoption of ASU 2016-09 *Compensation – Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting* in January 2017, we elected to discontinue our past practice of estimating

forfeitures and now account for forfeitures as they occur.

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Stock Options

The following table is a summary of our stock options outstanding as of December 31, 2017 and 2018 and the changes that occurred during 2018:

	Number of Options (in thousands)	Weighted Average Exercise Price (per share)	Weighted Avg. Remaining Contractual Life in Years	Aggregate Intrinsic Value (in thousands)
Stock options outstanding, December 31, 2017	5,148	\$ 22.65	4.87	\$ 6,109
Stock options granted	—	\$ —		
Stock options exercised	(96)	\$ 15.46		
Stock options forfeited	(73)	\$ 16.49		
Stock options expired	(597)	\$ 22.58		
Stock options outstanding, December 31, 2018	4,382	\$ 22.91	4.10	\$ —
Stock options exercisable, December 31, 2018	4,131	\$ 23.37	3.93	\$ —

At December 31, 2018, total unrecognized compensation expense related to non-vested stock options was approximately \$0.8 million, which is expected to be recognized over an average remaining recognition period of one year.

All of the options above were issued at exercise prices that approximated fair market value at the date of grant. At December 31, 2018, 2.5 million options were available for grant under the shareholder-approved plans.

The aggregate intrinsic values in the table above represent the total pre-tax intrinsic value (the difference between ADTRAN's closing stock price on the last trading day of 2018 and the exercise price, multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their options on December 31, 2018. The amount of aggregate intrinsic value will change based on the fair market value of ADTRAN's stock.

The total pre-tax intrinsic value of options exercised during 2018, 2017 and 2016 was \$0.2 million, \$3.4 million and \$1.1 million, respectively. The fair value of options fully vesting during 2018, 2017 and 2016 was \$2.5 million, \$4.3 million and \$5.7 million, respectively.

The following table further describes our stock options outstanding as of December 31, 2018:

Range of	Options Outstanding Options	Options Exercisable Options	Weighted Options Weighted
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Exercise Prices	Outstanding at 12/31/18	Weighted Avg. Remaining Contractual Life	Average Exercise Price	Exercisable at 12/31/18	Average Exercise Price
		(in Years)			
\$14.88 – \$18.96	1,257	5.93	\$ 15.87	1,006	\$ 15.99
\$18.97 – \$23.45	739	5.68	\$ 19.12	739	\$ 19.12
\$23.46 – \$30.35	1,223	3.18	\$ 23.87	1,223	\$ 23.87
\$30.36 – \$41.92	1,163	2.29	\$ 31.93	1,163	\$ 31.93
	4,382			4,131	

We use the Black-Scholes option pricing model (Black-Scholes Model) for the purpose of determining the estimated fair value of stock option awards on the date of grant. The Black-Scholes Model requires the input of certain assumptions that involve judgment. Because our stock options have characteristics significantly different from those of traded options, and because changes in the input assumptions can materially affect the fair value estimate, existing models may not provide reliable measures of fair value of our stock options.

The stock option pricing model requires the use of several assumptions that impact the fair value estimate. These variables include, but are not limited to, the volatility of our stock price and employee exercise behaviors.

There were no stock options granted in 2017 or 2018. The weighted-average estimated fair value of stock options granted to employees during the year ended December 31, 2016 was \$5.22 per share, with the following weighted-average assumptions:

	2016
Expected volatility	34.79%
Risk-free interest rate	1.36 %
Expected dividend yield	1.98 %
Expected life (in years)	6.25

We based our estimate of expected volatility for the year ended December 31, 2016 on the sequential historical daily trading data of our common stock for a period equal to the expected life of the options granted. The selection of the historical volatility method was based on available data indicating our historical volatility is as equally representative of our future stock price trends as is our implied volatility. The risk-free interest rate assumption is based upon implied yields of U.S. Treasury zero-coupon bonds on the date of grant having a remaining term equal to the expected life of the options granted. The dividend yield is based on our historical and expected dividend payouts. The expected life of our stock options is based upon historical exercise and forfeiture activity of our previous stock-based grants with a ten-year contractual term.

PSUs, RSUs and restricted stock

Under the 2015 Plan, awards other than stock options, including PSUs, RSUs, and restricted stock, may be granted to certain employees and officers.

Under our market-based PSU program, the number of shares of common stock earned by a recipient pursuant to the PSUs is subject to a market condition based on ADTRAN's relative total shareholder return against all companies in the NASDAQ Telecommunications Index at the end of a three-year performance period. Depending on the relative total shareholder return over the performance period, the recipient may earn from 0% to 150% of the shares underlying the PSUs, with the shares earned distributed upon the vesting of the PSUs at the end of the three-year performance period. The fair value of the award is based on the market price of our common stock on the date of grant, adjusted for the expected outcome of the impact of market conditions using a Monte Carlo Simulation valuation method. A portion of the granted PSUs vests and the underlying shares become deliverable upon the death or disability of the recipient or upon a change of control of ADTRAN, as defined by the 2015 Plan. The recipients of the PSUs receive dividend credits based on the shares of common stock underlying the PSUs. The dividend credits are vested and earned in the same manner as the PSUs and are paid in cash upon the issuance of common stock for the PSUs.

During the first quarter of 2017, the Compensation Committee of the Board of Directors approved a one-time PSU grant of 0.5 million shares that contain performance conditions and vest at the end of a three-year period if such performance conditions are met. The fair value of these performance-based PSU awards was equal to the closing price of our stock on the date of grant.

The fair value of RSUs and restricted stock is equal to the closing price of our stock on the business day immediately preceding the grant date. RSUs and restricted stock vest ratably over four-year and one-year periods, respectively.

We will continue to assess the assumptions and methodologies used to calculate the estimated fair value of stock-based compensation. If circumstances change, and additional data becomes available over time, we may change our assumptions and methodologies, which may materially impact our fair value determination.

The following table is a summary of our PSUs, RSUs and restricted stock outstanding as of December 31, 2017 and 2018 and the changes that occurred during 2018. The unvested awards outstanding as of December 31, 2017 have been adjusted for the actual shares vested in 2018 for our market-based PSUs.

	Number of	Weighted Average Grant
(In thousands, except per share amounts)	shares	Date Fair Value
Unvested PSUs, RSUs and restricted stock outstanding, December 31, 2017	1,292	\$ 21.33
PSUs, RSUs and restricted stock granted	690	\$ 14.48
PSUs, RSUs and restricted stock vested	(217)	\$ 19.94
PSUs, RSUs and restricted stock forfeited	(195)	\$ 21.29
Unvested RSUs and restricted stock outstanding, December 31, 2018	1,570	\$ 18.52

At December 31, 2018, total unrecognized compensation expense related to the non-vested portion of market-based PSUs, RSUs and restricted stock was approximately \$17.8 million, which is expected to be recognized over an average remaining recognition period of 3.0 years. In addition, there was \$9.1 million of unrecognized compensation expense related to the unvested 2017 performance-based PSUs, which will be recognized over the remaining requisite service period if achievement of the performance obligation becomes probable. For the years ended December 31, 2018 and 2017, no compensation expense was recognized related to these performance-based PSUs.

The market based PSU pricing model also requires the use of several significant assumptions that impact the fair value estimate. The estimated fair value of the PSUs granted to employees during the year ended December 31, 2018, 2017 and 2016 was \$16.59 per share, \$24.17 per share and \$23.50 per share, respectively, with the following assumptions:

	2018	2017	2016
Expected volatility	27.98% to 31.58%	27.03%	29.79%
Risk-free interest rate	2.11% to 2.99%	1.78%	1.17%
Expected dividend yield	1.83% to 2.49%	1.74%	1.80%

Note 5 – Investments

Debt securities and Other Investments

At December 31, 2018, we held the following debt securities and other investments, recorded at either fair value or cost:

(In thousands)	Amortized Cost	Gross		Carrying Value
		Unrealized Gains	Unrealized Losses	
Corporate bonds	\$ 20,777	\$ 19	\$(112)	\$ 20,684
Municipal fixed-rate bonds	1,339	—	(26)	1,313
Asset-backed bonds	5,230	5	(14)	5,221
Mortgage/Agency-backed bonds	3,833	2	(44)	3,791
U.S. government bonds	9,271	1	(66)	9,206
Foreign government bonds	592	—	(8)	584
Available-for-sale debt securities held at fair value	\$ 41,042	\$ 27	\$(270)	\$ 40,799
Restricted investment held at cost				25,600
Other investments held at cost				397
Total carrying value of available-for-sale investments				\$ 66,796

At December 31, 2017, we held the following debt securities and other investments, recorded at either fair value or cost:

Amortized	Carrying
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(In thousands)	Cost	Gross Unrealized		Value
		Gains	Losses	
Corporate bonds	\$ 32,654	\$44	\$(155)	\$ 32,543
Municipal fixed-rate bonds	2,902	2	(22)	2,882
Asset-backed bonds	6,545	1	(20)	6,526
Mortgage/Agency-backed bonds	5,554	1	(46)	5,509
U.S. government bonds	14,477	—	(174)	14,303
Foreign government bonds	725	5	—	730
Available-for-sale debt securities held at fair value	\$ 62,857	\$53	\$(417)	\$ 62,493
Restricted investment held at cost				27,800
Other investments held at cost				547
Total carrying value of available-for-sale investments				\$ 90,840

As of December 31, 2018, our debt securities had the following contractual maturities:

	Corporate	Municipal fixed-rate	Asset-backed	Mortgage / Agency-backed	U.S. government	Foreign government
(In thousands)	bonds	bonds	bonds	bonds	bonds	bonds
Less than one year	\$ 2,127	\$ 176	\$ 943	\$ —	\$ —	\$ —
One to two years	11,557	208	401	—	6,714	285
Two to three years	6,831	929	193	425	—	299
Three to five years	169	—	2,433	853	2,492	—
Five to ten years	—	—	260	6	—	—
More than ten years	—	—	991	2,507	—	—
Total	\$ 20,684	\$ 1,313	\$ 5,221	\$ 3,791	\$ 9,206	\$ 584

Actual maturities may differ from contractual maturities as some borrowers have the right to call or prepay obligations with or without call or prepayment penalties.

Realized gains and losses on sales of securities are computed under the specific identification method. The following table presents gross realized gains and losses related to our debt securities for the years ended December 31, 2018, 2017 and 2016:

Year Ended December 31,

(In thousands)	2018	2017	2016
Gross realized gains on debt securities	\$57	\$169	\$341
Gross realized losses on debt securities	(592)	(226)	(222)
Total gain (loss) recognized, net	\$(535)	\$(57)	\$119

Our investment policy provides limitations for issuer concentration, which limits, at the time of purchase, the concentration in any one issuer to 5% of the market value of our total investment portfolio.

The following table presents the breakdown of debt securities and other investments with unrealized losses at December 31, 2018:

Continuous Unrealized	Continuous Unrealized	Total
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Loss Position for 12

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(In thousands)	Loss Position for Less		Months or Greater		than 12 Months	
	Unrealized		Unrealized		Unrealized	
	Fair Value	Losses	Fair Value	Losses	Fair Value	Losses
Corporate bonds	11,129	(60)	3,608	(52)	14,737	(112)
Municipal fixed-rate bonds	—	—	1,136	(26)	1,136	(26)
Asset-backed bonds	1,874	(2)	1,257	(12)	3,131	(14)
Mortgage/Agency-backed bonds	1,021	(5)	1,918	(39)	2,939	(44)
U.S. government bonds	6,527	(48)	537	(18)	7,064	(66)
Foreign government bonds	584	(8)	—	—	584	(8)
Total	\$21,135	\$ (123)	\$8,456	\$ (147)	\$29,591	\$ (270)

The following table presents the breakdown of debt securities and other investments with unrealized losses at December 31, 2017:

(In thousands)	Continuous Unrealized		Continuous Unrealized		Total Unrealized	
	Loss Position for Less		Loss Position for 12 Months or Greater		Total	
	Fair Value	Losses	Fair Value	Losses	Fair Value	Losses
Corporate bonds	16,015	(58)	6,112	(97)	22,127	(155)
Municipal fixed-rate bonds	230	—	1,165	(22)	1,395	(22)
Asset-backed bonds	4,941	(17)	179	(3)	5,120	(20)
Mortgage/Agency-backed bonds	3,062	(8)	1,673	(38)	4,735	(46)
U.S. government bonds	2,754	(26)	11,549	(148)	14,303	(174)
Total	\$27,002	\$ (109)	\$20,678	\$ (308)	\$47,680	\$ (417)

The decrease in unrealized losses during 2018, as reflected in the table above, results from changes in market positions associated with our fixed income portfolio.

Marketable Equity Securities

Our marketable equity securities consist of publicly traded stocks or funds measured at fair value.

Prior to January 1, 2018, our marketable equity securities were classified as available-for-sale. Realized gains and losses on marketable equity securities were included in net investment gain (loss). Unrealized gains and losses were recognized in accumulated other comprehensive income, net of deferred taxes, on the balance sheet.

On January 1, 2018, we adopted ASU 2016-01, which requires us to measure all equity investments that do not result in consolidation and are not accounted for under the equity method at fair value, with any changes in fair value recognized in net investment gain (loss). Upon adoption, we reclassified \$3.2 million of net unrealized gains related to marketable equity securities from accumulated other comprehensive income (loss) to opening retained earnings.

Realized and unrealized gains and losses for our marketable equity securities for the twelve months ended December 31, 2018 were as follows:

(In thousands)	2018
Realized gains on equity securities sold	\$ 1,306
Unrealized losses on equity securities held	(4,821)
Total loss recognized, net	\$(3,515)

We have categorized our cash equivalents and our investments held at fair value into a three-level fair value hierarchy based on the priority of the inputs to the valuation technique for the cash equivalents and investments as follows: Level 1 - Values based on unadjusted quoted prices for identical assets or liabilities in an active market; Level 2 - Values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly; Level 3 - Values based on prices or valuation techniques that require inputs that are both unobservable and significant to the overall fair value measurement. These inputs could include information supplied by investees.

	Fair Value Measurements at December 31, 2018	
	Using	
(In thousands)	Fair Value	Significant

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		Quoted Prices in Active Market for Identical Assets (Level 1)	Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	
Cash equivalents					
Money market funds	\$ 1,554	\$ 1,554	\$ —	\$	—
Cash equivalents	1,554	1,554	—		—
Available-for-sale debt securities					
Corporate bonds	20,684	—	20,684		—
Municipal fixed-rate bonds	1,313	—	1,313		—
Asset-backed bonds	5,221	—	5,221		—
Mortgage/Agency-backed bonds	3,791	—	3,791		—
U.S. government bonds	9,206	9,206	—		—
Foreign government bonds	584	—	584		—
Marketable equity securities					—
Marketable equity securities – various industries	26,763	26,763	—		—
Equity in escrow	253	253	—		—
Deferred compensation plan assets	18,256	18,256	—		—
Available-for-sale securities	86,071	54,478	31,593		—
Total	\$ 87,625	\$ 56,032	\$ 31,593	\$	—

Fair Value Measurements at December 31, 2017
Using

	Quoted Prices	in Active	Market Significant	
			for Identical	Other
(In thousands)	Fair Value	(Level 1)	Assets	Significant
			Inputs	Unobservable Inputs
			(Level 2)	(Level 3)
Cash equivalents				
Money market funds	\$5,851	\$5,851	\$ —	\$ —
Commercial paper	3,999	—	3,999	—
Cash equivalents	9,850	5,851	3,999	—
Available-for-sale debt securities				
Corporate bonds	32,543	—	32,543	—
Municipal fixed-rate bonds	2,882	—	2,882	—
Asset-backed bonds	6,526	—	6,526	—
Mortgage/Agency-backed bonds	5,509	—	5,509	—
U.S. government bonds	14,303	14,303	—	—
Foreign government bonds	730	—	730	—
Marketable equity securities				
Marketable equity securities – various industries	35,662	35,662	—	—
Deferred compensation plan assets	19,883	19,883	—	—
Available-for-sale securities	118,038	69,848	48,190	—
Total	\$127,888	\$75,699	\$ 52,189	\$ —

The fair value of our Level 2 securities is calculated using a weighted average market price for each security. Market prices are obtained from a variety of industry standard data providers, security master files from large financial institutions, and other third-party sources. These multiple market prices are used as inputs into a distribution-curve-based algorithm to determine the daily market value of each security.

Note 6 – Derivative Instruments and Hedging Activities

We participate in foreign exchange forward contracts in connection with the management of exposure to fluctuations in foreign exchange rates.

Cash Flow Hedges

Our cash flow hedging activities utilize foreign exchange forward contracts to reduce the risk that movements in exchange rates will adversely affect the net cash flows resulting from the planned purchase of products from foreign suppliers. Purchases of U.S. denominated inventory by our European subsidiary represent our primary exposure. Changes in the fair value of derivatives designated as cash flow hedges are not recognized in current operating results, but are recorded in accumulated other comprehensive income. Amounts related to cash flow hedges are reclassified from accumulated other comprehensive income when the underlying hedged item impacts earnings. This reclassification is recorded in the same line item of the consolidated statements of income as where the effects of the hedged item are recorded, which is cost of sales.

Undesignated Hedges

We have certain customers and suppliers who are invoiced or pay in a non-functional currency. Changes in the monetary exchange rates may adversely affect our results of operations and financial condition, as outstanding non-functional balances are revalued to the functional currency through profit and loss. When appropriate, we utilize foreign exchange forward contracts to help manage the volatility relating to these valuation exposures. All changes in the fair value of our derivative instruments that do not qualify for or are not designated for hedged accounting transactions are recognized as other income (expense), net in the Consolidated Statements of Income.

We do not hold or issue derivative instruments for trading or other speculative purposes. Our derivative instruments are recorded in the Consolidated Balance Sheets at their fair values. Our derivative instruments are not subject to master netting arrangements and are not offset in the Consolidated Balance Sheets.

As of December 31, 2018 and 2017, we had no foreign exchange forward contracts.

The change in the fair values of our derivative instruments recorded in the Consolidated Statements of Income during the years ended December 31, 2018, 2017 and 2016 were as follows:

(In thousands)	Income Statement Location	2018	2017	2016
Derivatives Not Designated as Hedging Instruments:				
Foreign exchange contracts	Other income (expense)	\$ 13	\$(754)	\$724

The change in our derivatives designated as hedging instruments recorded in other comprehensive income (OCI) and reclassified to income, net of tax, during the twelve months ended December 31, 2018, 2017 and 2016 were as follows:

(In thousands)	Location of Losses Reclassified from AOCI into Income	Amount of Losses Reclassified from AOCI into Income	2018	2017	2016
Derivatives Designated as Hedging Instruments:					
Foreign exchange contracts	Cost of Sales		\$—	\$(897)	\$ —

Note 7 – Inventory

At December 31, 2018 and 2017, inventory was comprised of the following:

(In thousands)	2018	2017
Raw materials	\$45,333	\$44,185
Work in process	1,638	1,939
Finished goods	52,877	76,418
Total Inventory, net	\$99,848	\$122,542

We establish reserves for estimated excess, obsolete, or unmarketable inventory equal to the difference between the cost of the inventory and the estimated fair value of the inventory based upon assumptions about future demand, market conditions, and life. At December 31, 2018 and 2017, raw materials reserves totaled \$17.6 million and \$15.0 million, respectively, and finished goods inventory reserves totaled \$12.4 million and \$8.3 million, respectively.

Note 8 – Property, Plant and Equipment

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At December 31, 2018 and 2017, property, plant and equipment were comprised of the following:

(In thousands)	2018	2017
Land	\$4,575	\$4,575
Building and land improvements	34,379	32,470
Building	68,183	68,301
Furniture and fixtures	19,831	19,489
Computer hardware and software	92,071	90,726
Engineering and other equipment	127,060	123,363
Total Property, Plant and Equipment	346,099	338,924
Less accumulated depreciation	(265,464)	(253,845)
Total Property, Plant and Equipment, net	\$80,635	\$85,079

Depreciation expense was \$12.7 million, \$12.8 million and \$12.0 million for the years ended December 31, 2018, 2017 and 2016, respectively, which is recorded in cost of sales, selling, general and administrative expense and research and development expense in the consolidated statements of income.

Note 9 – Lease Arrangements

We are the lessor in sales-type lease arrangements for network equipment, which have terms of 18 months to five years. The net investment in sales-type leases consists of lease receivables less unearned income. Collectability of sales-type leases is evaluated periodically at an individual customer level. At December 31, 2018 and 2017, we had no allowance for credit losses for our net investment in sales-type leases. As of December 31, 2018 and 2017, the components of the net investment in sales-type leases were as follows:

(In thousands)	2018	2017
Current minimum lease payments receivable (included in other receivables)	\$ 11,339	\$ 11,325
Non-current minimum lease payments receivable (included in other assets)	1,670	2,913
Total minimum lease payments receivable	13,009	14,238
Less: Current unearned revenue	631	707
Less: Non-current unearned revenue	473	787
Net investment in sales-type leases	\$ 11,905	\$ 12,744

Future minimum lease payments to be received from sales-type leases as of December 31, 2018 are as follows:

(In thousands)	Amount ⁽¹⁾
2019	\$11,339
2020	990
2021	431
2022	189
2023	60
Total	\$13,009

⁽¹⁾\$9.4 million of these future minimum lease payments relate to one of our customers who filed for Chapter 11 bankruptcy in February 2019. Therefore, there is a potential risk of uncollectibility related to any outstanding balance. See Note 18 of Notes to Consolidated Financial Statements for additional information.

Note 10 – Goodwill and Intangible Assets

Goodwill, which relates to our acquisitions of Bluesocket, Inc. and SmartRG, were \$7.1 million at December 31, 2018 and \$3.5 million at December 31, 2017 of which \$6.7 million and \$0.4 million is allocated to our Network Solutions and Services & Support reportable segments, respectively, for the year ended December 31, 2018 and of which \$3.1 million and \$0.4 million is allocated to our Network Solutions and Services & Support reportable segments, respectively, for the year ended December 31, 2017.

We evaluate the carrying value of goodwill during the fourth quarter of each year and between annual evaluations if events occur or circumstances change that would more likely than not reduce the fair value of the reporting unit below its carrying amount. We have elected to first assess the qualitative factors to determine whether it is more likely than not that the fair value of the reporting unit to which the goodwill is assigned is less than its carrying amount as a basis for determining whether it is necessary to perform the two-step impairment test. If we determine that it is more likely than not that its fair value is less than its carrying amount, then the two-step impairment test is performed. Based on the results of our qualitative assessment in 2018, we concluded that it was not necessary to perform the two-step impairment test. There were no impairment losses on goodwill recognized for the years ended December 31, 2018, 2017 and 2016.

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The following table presents our intangible assets as of December 31, 2018 and 2017:

(In thousands)	2018			2017		
	Gross Value	Accumulated Amortization	Net Value	Gross Value	Accumulated Amortization	Net Value
Customer relationships	\$22,455	\$ (5,380)	\$17,075	\$7,474	\$ (4,283)	\$3,191
Developed technology	12,801	(4,867)	7,934	5,524	(4,663)	861
Licensed technology	5,900	(520)	5,380	—	—	—
Supplier relationships	2,800	(1,108)	1,692	—	—	—
Patents	500	(157)	343	500	(89)	411
Licensing agreements	560	(5)	555	—	—	—
Intellectual property	930	(930)	—	930	(852)	78
Non-compete	200	(200)	—	200	(115)	85
Trade names	310	(106)	204	100	(65)	35
Total	\$46,456	\$ (13,273)	\$33,183	\$14,728	\$ (10,067)	\$4,661

Amortization expense was \$2.3 million, \$2.9 million and \$2.5 million for the years ended December 31, 2018, 2017 and 2016, respectively.

As of December 31, 2018, the estimated future amortization expense of intangible assets is as follows:

(In thousands)	Amount
2019	\$5,332
2020	4,450
2021	4,101
2022	3,477
2023	3,325
Thereafter	12,498
Total	\$33,183

Note 11 – Alabama State Industrial Development Authority Financing and Economic Incentives

In conjunction with the 1995 expansion of our Huntsville, Alabama, facility, we were approved for participation in an incentive program offered by the State of Alabama Industrial Development Authority (the Authority). Pursuant to the program, on January 13, 1995, the Authority issued \$20.0 million of its taxable revenue bonds and loaned the proceeds from the sale of the bonds to ADTRAN. The bonds were originally purchased by AmSouth Bank of Alabama, Birmingham, Alabama (now Regions Bank of Alabama) (the Bank). Wachovia Bank, N.A., Nashville, Tennessee (formerly First Union National Bank of Tennessee) (the Bondholder), which was acquired by Wells Fargo & Company on December 31, 2008, purchased the original bonds from the Bank and made further advances to the Authority, bringing the total amount outstanding to \$50.0 million. An Amended and Restated Taxable Revenue Bond (Amended and Restated Bond) was issued and the original financing agreement was amended. The Amended and Restated Bond bears interest, payable monthly. The interest rate is 2% per annum. The Amended and Restated Bond

matures on January 1, 2020, and is currently outstanding in the aggregate principal amount of \$25.6 million. The estimated fair value of the bond using a level 2 valuation technique at December 31, 2018 was approximately \$25.4 million based on a debt security with a comparable interest rate and maturity and a Standard & Poor's credit rating of AAA. We are required to make payments to the Authority in amounts necessary to pay the interest on the Amended and Restated Bond. Included in long-term investments at December 31, 2018 is \$25.6 million which is invested in a restricted certificate of deposit. These funds serve as a collateral deposit against the principal of this bond, and we have the right to set-off the balance of the Amended and Restated Bond with the collateral deposit in order to reduce the balance of the indebtedness.

In conjunction with this program, we are eligible to receive certain economic incentives from the state of Alabama that reduce the amount of payroll withholdings that we are required to remit to the state for those employment positions that qualify under the program. We realized economic incentives related to payroll withholdings totaling \$1.4 million, \$1.5 million and \$1.3 million for the years ended December 31, 2018, 2017 and 2016, respectively.

We made principal payments of \$1.1 million for each of the years ended December 31, 2018 and 2017, and anticipate making a principal payment in 2019. At December 31, 2018 and 2017, \$1.0 million and \$1.1 million, respectively of the bond debt was classified as a current liability in accounts payable in the Consolidated Balance Sheets.

Note 12 – Income Taxes

A summary of the components of the provision (benefit) for income taxes for the years ended December 31, 2018, 2017 and 2016 is as follows:

(In thousands)	2018	2017	2016
Current			
Federal	\$(8,001)	\$466	\$12,733
State	(476)	(150)	1,141
International	11,705	6,458	477
Total Current	3,228	6,774	14,351
Deferred			
Federal	(14,448)	8,024	647
State	(3,390)	1,882	73
International	581	4,167	(3,405)
Total Deferred	(17,257)	14,073	(2,685)
Total Provision (Benefit) for Income Taxes	\$(14,029)	\$20,847	\$11,666

Our effective income tax rate differs from the federal statutory rate due to the following:

	2018	2017	2016
Tax provision computed at the federal statutory rate	21.00 %	35.00 %	35.00 %
State income tax provision, net of federal benefit	14.53	2.17	3.93
Federal research credits	14.23	(11.88)	(8.15)
Foreign taxes	(11.45)	(2.27)	(0.34)
Tax-exempt income	0.45	(0.75)	(0.53)
State tax incentives	3.15	(2.71)	(2.77)
Stock-based compensation	(2.87)	1.43	2.53
Domestic production activity deduction	—	(1.13)	(2.23)
Bargain purchase	8.82	—	(2.64)
Impact of U.S. tax reform	12.00	26.70	—
Global intangible low-taxed income (GILTI)	(17.48)	—	—
Other, net	(0.34)	0.09	0.08
Effective Tax Rate	42.04 %	46.65 %	24.88 %

Income (loss) before provision for income taxes for the years ended December 31, 2018, 2017 and 2016 is as follows:

(In thousands)	2018	2017	2016
U.S. entities	\$(74,131)	\$26,552	\$54,077
International entities	40,760	18,135	(7,182)

Total \$(33,371) \$44,687 \$46,895

Income (loss) before provision (benefit) for income taxes for international entities reflects income (loss) based on statutory transfer pricing agreements. This amount does not correlate to consolidated international revenues, many of which occur from our U.S. entity.

Deferred income taxes on the balance sheet result from temporary differences between the amount of assets and liabilities recognized for financial reporting and tax purposes. The principal components of our current and non-current deferred taxes are as follows:

(In thousands)	2018	2017
Deferred tax assets		
Inventory	\$6,609	\$7,545
Accrued expenses	2,850	3,103
Investments	1,122	—
Deferred compensation	4,779	5,204
Stock-based compensation	3,069	2,988
Uncertain tax positions related to state taxes and related interest	326	370
Pensions	5,538	4,727
Foreign losses	3,097	3,091
State losses and credit carry-forwards	8,164	3,854
Federal loss and research carry-forwards	17,495	3,058
Valuation allowance	(5,816)	(6,006)
Total Deferred Tax Assets	47,233	27,934
Deferred tax liabilities		
Property, plant and equipment	(3,515)	(3,553)
Intellectual property	(6,531)	(663)
Investments	—	(290)
Total Deferred Tax Liabilities	(10,046)	(4,506)
Net Deferred Tax Assets	\$37,187	\$23,428

At December 31, 2018 and 2017, non-current deferred taxes related to our investments and our defined benefit pension plan reflect deferred taxes on the net unrealized gains and losses on available-for-sale investments and deferred taxes on unrealized losses in our pension plan. The net change in non-current deferred taxes associated with these items, a deferred tax benefit of \$2.8 million and \$1.7 million in 2018 and 2017, respectively, is recorded as an adjustment to other comprehensive income, presented in the Consolidated Statements of Comprehensive Income.

The Company continually reviews the adequacy of the valuation allowance and recognizes the benefits of deferred tax assets only as the reassessment indicates that it is more likely than not that the deferred tax assets will be recognized in accordance with ASC 740, *Income Taxes* (ASC 740). As of December 31, 2018, we had foreign losses of \$3.1 million. A valuation allowance of \$2.4 million has been established against the loss carryforwards. The foreign loss

carryforwards primarily resulted from an acquisition in 2009. As of December 31, 2018, we had \$8.2 million of state loss and tax credit carryforwards. We believe it is more likely than not we will not realize the full benefit of the deferred tax asset arising from these losses and credit carryforwards. Therefore, a valuation allowance of \$3.4 million has been established against these carryforwards. The valuation allowance relates to a particular state where we no longer generate sufficient state income. As of December 31, 2018, we had \$17.5 million of federal loss and research carryforwards. These carryforwards are the result of acquisitions in 2011 and 2018 as well as domestic operating losses in 2018. Management will continue to assess the realization of our deferred tax assets and related valuation allowance. As such, we may release a portion of the valuation allowance or establish a new valuation allowance based on operations in the jurisdictions in which these assets arose. Management continues to evaluate all evidence including historical operating results, the existence of losses in the most recent year, forecasted earnings, future taxable income, and tax planning strategies. Should management determine a valuation allowance is needed in the future due to not being able to absorb loss carryforwards, it would have a material impact on our consolidated financial statements.

The deferred tax assets for foreign and domestic carry-forwards, research and development tax credits, unamortized research and development costs, and state credit carry-forwards are \$28.8 million. Some of these deferred tax assets will expire between 2019 and 2030 and others carryforward indefinitely. We will continue to assess the realization of our deferred tax assets and related valuation allowances. The net change in our valuation allowance from December 31, 2017 to December 31, 2018 was \$(0.2) million.

As of December 31, 2018 and 2017, respectively, our cash and cash equivalents were \$105.5 million and \$86.4 million and short-term investments were \$3.2 million and \$16.1 million, which provided available short-term liquidity of \$108.7 million and \$102.6 million. Of these amounts, our foreign subsidiaries held cash of \$87.1 million and \$56.8 million, respectively, representing approximately 80.1% and 55.4% of available short-term liquidity, which is used to fund on-going liquidity needs of these subsidiaries. We intend to permanently reinvest these funds outside the U.S., except to the extent any of these funds can be repatriated without withholding tax, and our current business plans do not indicate a need to repatriate to fund domestic operations. However, if all these funds were repatriated to the U.S. or used for U.S. operations, certain amounts could be subject to tax. Due to the timing and circumstances of repatriation of such earnings, if any, it is not practical to determine the amount of funds subject to unrecognized deferred tax liability.

During 2018, 2017 and 2016, we recorded no income tax benefit or expense for stock options exercised as an adjustment to equity. This is calculated on the difference between the exercise price of stock option exercises and the market price of the underlying common stock upon exercise.

The change in the unrecognized income tax benefits for the years ended December 31, 2018, 2017 and 2016 is reconciled below:

(In thousands)	2018	2017	2016
Balance at beginning of period	\$2,366	\$2,226	\$2,537
Increases for tax position related to:			
Prior years	3	465	95
Current year	254	285	428
Decreases for tax positions related to:			
Prior years	—	(14)	—
Settlements with taxing authorities	—	—	—
Expiration of applicable statute of limitations	(755)	(596)	(834)
Balance at end of period	\$1,868	\$2,366	\$2,226

As of December 31, 2018, 2017 and 2016, our total liability for unrecognized tax benefits was \$1.9 million, \$2.4 million and \$2.2 million, respectively, of which \$1.7 million, \$2.2 million and \$1.7 million, respectively, would reduce our effective tax rate if we were successful in upholding all of the uncertain positions and recognized the amounts recorded. We classify interest and penalties recognized on the liability for unrecognized tax benefits as income tax expense. As of December 31, 2018, 2017 and 2016, the balances of accrued interest and penalties were \$0.7 million, \$0.8 million and \$0.8 million, respectively.

We do not anticipate a single tax position generating a significant increase or decrease in our liability for unrecognized tax benefits within 12 months of this reporting date. We file income tax returns in the U.S. federal and various state jurisdictions and several foreign jurisdictions. We are not currently under audit by the Internal Revenue Service. Generally, we are not subject to changes in income taxes by any taxing jurisdiction for the years prior to

2015.

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Note 13 – Employee Benefit Plans

Pension Benefit Plan

We maintain a defined benefit pension plan covering employees in certain foreign countries.

The pension benefit plan obligations and funded status at December 31, 2018 and 2017, are as follows:

(In thousands)	2018	2017
Change in projected benefit obligation:		
Projected benefit obligation at beginning of period	\$34,893	\$30,011
Service cost	1,193	1,260
Interest cost	727	607
Actuarial loss - experience	38	47
Actuarial (gain) loss - assumptions	2,139	(1,294)
Benefit payments	(138)	(80)
Effects of foreign currency exchange rate changes	(1,615)	4,342
Projected benefit obligation at end of period	37,237	34,893
Change in plan assets:		
Fair value of plan assets at beginning of period	26,624	20,045
Actual return (loss) on plan assets	(2,024)	709
Contributions	688	3,001
Effects of foreign currency exchange rate changes	(1,129)	2,869
Fair value of plan assets at end of period	24,159	26,624
Unfunded status at end of period	\$(13,078)	\$(8,269)

The accumulated benefit obligation was \$37.2 million and \$32.9 million at December 31, 2018 and 2017, respectively. The increase in the accumulated benefit obligation and the actuarial loss is primarily attributable to a decrease in the discount rate during 2018.

The net amounts recognized in the balance sheet for the unfunded pension liability as of December 31, 2018 and 2017 are as follows:

(In thousands)	2018	2017
Current liability	\$—	\$—
Non-current liability	13,078	8,269
Total	\$13,078	\$8,269

The components of net periodic pension cost, other than the service cost component, are included in other income (expense), net in the consolidated statements of income (loss). The components of net periodic pension cost and amounts recognized in other comprehensive income (loss) for the years ended December 31, 2018, 2017 and 2016 are as follows:

(In thousands)	2018	2017	2016
Net periodic benefit cost:			
Service cost	\$1,193	\$1,260	\$1,211
Interest cost	727	607	720
Expected return on plan assets	(1,548)	(1,267)	(1,057)
Amortization of actuarial losses	247	309	175
Net periodic benefit cost	619	909	1,049
Other changes in plan assets and benefit obligations			
recognized in other comprehensive income:			
Net actuarial (gain) loss	5,638	(654)	1,782
Amortization of actuarial losses	(196)	(406)	(156)
Amount recognized in other comprehensive income (loss)	5,442	(1,060)	1,626
Total recognized in net periodic benefit cost and other			
comprehensive income (loss)	\$6,061	\$(151)	\$2,675

The amounts recognized in accumulated other comprehensive income as of December 31, 2018 and 2017 are as follows:

(In thousands)	2018	2017
Net actuarial loss	\$(11,256)	\$(5,812)

The defined benefit pension plan is accounted for on an actuarial basis, which requires the selection of various assumptions, including an expected rate of return on plan assets and a discount rate. The expected return on our German plan assets that is utilized in determining the benefit obligation and net periodic benefit cost is derived from periodic studies, which include a review of asset allocation strategies, anticipated future long-term performance of individual asset classes, risks using standard deviations, and correlations of returns among the asset classes that comprise the plans' asset mix. While the studies give appropriate consideration to recent plan performance and historical returns, the assumptions are primarily long-term, prospective rates of return.

Another key assumption in determining net pension expense is the assumed discount rate to be used to discount plan obligations. The discount rate has been derived from the returns of high-quality, corporate bonds denominated in Euro currency with durations close to the duration of our pension obligations.

The weighted-average assumptions that were used to determine the net periodic benefit cost for the years ended December 31, 2018, 2017 and 2016 are as follows:

	2018	2017	2016
Discount rates	2.13%	1.90%	2.64%
Rate of compensation increase	2.00%	2.00%	2.00%
Expected long-term rates of return	5.90%	5.90%	5.40%

The weighted-average assumptions that were used to determine the benefit obligation at December 31, 2018 and 2017:

	2018	2017
Discount rates	1.75%	2.13%
Rate of compensation increase	2.00%	2.00%

Actuarial gains and losses are recorded in accumulated other comprehensive income. To the extent unamortized gains and losses exceed 10% of the higher of the market-related value of assets or the projected benefit obligation, the excess is amortized as a component of net periodic pension cost over the remaining service period of active participants. We estimate that \$0.7 million will be amortized from accumulated other comprehensive income into net periodic pension cost in 2019 for the net actuarial loss.

We anticipate making a contribution to the pension plan in 2019 of approximately \$1.1 million which reflects the net amount of service costs less expected benefit payments. The following pension benefit payments, which reflect

expected future service, as appropriate, are expected to be paid to participants:

(In thousands)

2019	\$400
2020	555
2021	646
2022	704
2023	808
2024 – 2028	5,430
Total	\$8,543

We have categorized our cash equivalents and our investments held at fair value that are included in the pension plan into a three-level fair value hierarchy based on the priority of the inputs to the valuation technique for the cash equivalents and investments as follows: Level 1 - values based on unadjusted quoted prices for identical assets or liabilities in an active market; Level 2 - values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly; Level 3 - values based on prices or valuation techniques that require inputs that are both unobservable and significant to the overall fair value measurement. These inputs include information supplied by investees.

Fair Value Measurements at December 31,
2018 Using

	Fair Value	Quoted Prices	Significant	
		in Active Markets for Identical Assets	Other	Significant
(In thousands)		(Level 1)	Observable Inputs (Level 2)	Unobservable Inputs (Level 3)
Cash and cash equivalents	\$1,010	\$1,010	\$ —	\$ —
Available-for-sale securities				
Bond funds:				
Government bonds	6,268	6,268	—	—
Corporate bonds	4,840	4,840	—	—
Emerging markets bonds	443	443	—	—
Equity funds:				
Global equity	7,743	7,743	—	—
Emerging markets	1,188	1,188	—	—
Balanced fund	815	815	—	—
Large-cap value	262	262	—	—
Global real estate fund	926	926	—	—
Managed futures fund	664	664	—	—
Available-for-sale securities	23,149	23,149	—	—
Total	\$24,159	\$24,159	\$ —	\$ —

Fair Value Measurements at December 31,
2017 Using

(In thousands)	Fair Value	Quoted Prices	Significant Other	Significant Unobservable
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		in Active Markets for	Observable Inputs (Level 2)	Inputs (Level 3)		
		Identical Assets (Level 1)				
Cash and cash equivalents	\$3,005	\$3,005	\$	—	\$	—
Available-for-sale securities						
Bond funds:						
Corporate bonds	14,349	14,349	—	—	—	—
Government bonds	2,305	2,305	—	—	—	—
Equity funds:						
Large-cap blend	5,758	5,758	—	—	—	—
Balanced fund	898	898	—	—	—	—
Large cap value	309	309	—	—	—	—
Available-for-sale securities	23,619	23,619	—	—	—	—
Total	\$26,624	\$26,624	\$	—	\$	—

Our investment policy includes various guidelines and procedures designed to ensure assets are invested in a manner necessary to meet expected future benefits earned by participants, and consider a broad range of economic conditions. Central to the policy are target allocation ranges by asset class, which is currently 50% for bond funds, 40% for equity funds and 10% cash, real estate and managed futures.

The objectives of the target allocations are to maintain investment portfolios that diversify risk through prudent asset allocation parameters, achieve asset returns that meet or exceed the plans' actuarial assumptions, and achieve asset returns that are competitive with like institutions employing similar investment strategies.

The investment policy is periodically reviewed by us and a designated third-party fiduciary for investment matters. The policy is established and administered in a manner that is compliant at all times with applicable government regulations.

401(k) Savings Plan

We maintain the ADTRAN, Inc. 401(k) Retirement Plan (Savings Plan) for the benefit of our eligible employees. The Savings Plan is intended to qualify under Sections 401(a) and 401(k) of the Internal Revenue Code of 1986, as amended (Code), and is intended to be a “safe harbor” 401(k) plan under Code Section 401(k)(12). The Savings Plan allows employees to save for retirement by contributing part of their compensation to the plan on a tax-deferred basis. The Savings Plan also requires us to contribute a “safe harbor” amount each year. We match up to 4% of employee contributions (100% of an employee’s first 3% of contributions and 50% of their next 2% of contributions), beginning on the employee’s one-year anniversary date. In calculating our matching contribution, we only use compensation up to the statutory maximum under the Code (\$275,000 for 2018). All contributions under the Savings Plan are 100% vested. Expenses recorded for employer contributions and plan administration costs for the Savings Plan amounted to approximately \$4.4 million, \$4.6 million and \$4.1 million in 2018, 2017 and 2016, respectively.

Deferred Compensation Plans

We maintain four deferred compensation programs for certain executive management employees and our Board of Directors.

For our executive management employees, the ADTRAN, Inc. Deferred Compensation Program for Employees is offered as a supplement to our tax-qualified 401(k) plan and is available to certain executive management employees who have been designated by our Board of Directors. This deferred compensation plan allows participants to defer all or a portion of certain specified bonuses and up to 25% of remaining cash compensation, and permits us to make matching contributions on a discretionary basis, without the limitations that apply to the 401(k) plan. To date, we have not made any matching contributions under this plan. We also maintain the ADTRAN, Inc. Equity Deferral Program for Employees. Under this plan, participants may elect to defer all or a portion of their vested PSU’s and RSU’s to the Plan. Such deferrals shall continue to be held and deemed to be invested in shares of ADTRAN stock unless and until the amounts are distributed or such deferrals are moved to another deemed investment pursuant to an election made by the Participant.

For our Board of Directors, we maintain the ADTRAN, Inc. Deferred Compensation Program for Directors. This program allows our Board of Directors to defer all or a portion of monetary remuneration paid to the Director, including, but not limited to, meeting fees and annual retainers. We also maintain the ADTRAN, Inc. Equity Deferral Program for Directors. Under this plan, participants may elect to defer all or a portion of their vested restricted stock awards. Such deferrals shall continue to be held and deemed to be invested in shares of ADTRAN stock unless and until the amounts are distributed or such deferrals are moved to another deemed investment pursuant to an election made by the Director.

We have set aside the plan assets for all plans in a rabbi trust (the Trust) and all contributions are credited to bookkeeping accounts for the participants. The Trust assets are subject to the claims of our creditors in the event of bankruptcy or insolvency. The assets of the Trust are deemed to be invested in pre-approved mutual funds as directed by each participant, and the participant’s bookkeeping account is credited with the earnings and losses attributable to those investments. Benefits are scheduled to be distributed six months after termination of employment in a single lump sum payment or annual installments paid over a three or ten-year term based on the participant’s election. Distributions will be made on a pro-rata basis from each of the hypothetical investments of the Participant’s account in cash. Any whole shares of ADTRAN, Inc. common stock that are distributed will be distributed in-kind.

Assets of the Trust are deemed invested in mutual funds that cover an investment spectrum ranging from equities to money market instruments. These mutual funds are publicly quoted and reported at fair value. The fair value of the assets held by the Trust and the amounts payable to the plan participants at December 31, 2018 and 2017 are as follows:

(In thousands)	2018	2017
Fair Value of Plan Assets		
Long-term investments	\$ 18,256	\$ 19,883
Total Fair Value of Plan Assets	\$ 18,256	\$ 19,883
Amounts Payable to Plan Participants		
Non-current liabilities	\$ 18,256	\$ 19,883
Total Amounts Payable to Plan Participants	\$ 18,256	\$ 19,883

Interest and dividend income of the Trust have been included in interest and dividend income in the accompanying 2018, 2017 and 2016 Consolidated Statements of Income (Loss). Changes in the fair value of the plan assets held by the Trust have been included in other income (expense) in the accompanying 2018, 2017 and 2016 Consolidated Statements of Income (Loss). Changes in the fair value of the deferred compensation liability are included as selling, general, and administrative expense in the accompanying 2018, 2017 and 2016 Consolidated Statements of Income (Loss). Based on the changes in the total fair value of the Trust's assets, we recorded deferred compensation income (expense) in 2018, 2017 and 2016 of \$2.1 million, \$(2.6) million and \$(1.3) million, respectively.

Retiree Medical Coverage

We provided medical, dental and prescription drug coverage to one retired former officer and his spouse, for his life, on the same terms as provided to our active officers, and to the spouse of a former deceased officer for up to 30 years. At December 31, 2018 and 2017, this liability totaled \$0.1 million.

Note 14 – Segment Information and Major Customers

Our chief operating decision maker regularly reviews our financial performance based on two reportable segments – Network Solutions and Services & Support. Network Solutions includes software and hardware products and next-generation virtualized solutions used in service provider or business networks, as well as prior-generation products. Services & Support includes our suite of ProCloud managed services, network installation, engineering and maintenance services, and fee-based technical support and equipment repair/replacement plans.

We evaluate the performance of our segments based on gross profit. Selling, general, and administrative expenses, research and development expenses, interest and dividend income, interest expense, net investment gain (loss), other income (expense) and provision (benefit) for taxes are reported on a company-wide, functional basis only. There are no inter-segment revenues.

The following table presents information about the reported sales and gross profit of our reportable segments for each of the years ended December 31, 2018, 2017 and 2016. Asset information by reportable segment is not reported, since we do not produce such information internally.

	2018		2017		2016	
(In thousands)	Sales	Gross Profit	Sales	Gross Profit	Sales	Gross Profit
Network Solutions	\$458,232	\$179,303	\$540,396	\$260,833	\$525,502	\$254,797
Services & Support	71,045	24,262	126,504	42,802	111,279	36,533
Total	\$529,277	\$203,565	\$666,900	\$303,635	\$636,781	\$291,330

Sales by Category

In addition to the above reporting segments, we also report revenue for the following three categories – Access & Aggregation, Subscriber Solutions & Experience, and Traditional & Other Products.

The following tables disaggregates our revenue by major source for the years ended December 31, 2018, 2017 and 2016:

(In thousands)	2018		
	Network Solutions	Services & Support	Total
Access & Aggregation	\$301,801	\$57,069	\$358,870
Subscriber Solutions & Experience ⁽¹⁾	129,067	5,393	134,460
Traditional & Other Products	27,364	8,583	35,947
Total	\$458,232	\$71,045	\$529,277

(In thousands)	2017		
	Network Solutions	Services & Support	Total
Access & Aggregation	\$361,955	\$111,989	\$473,944
Subscriber Solutions & Experience ⁽¹⁾	132,294	6,162	138,456
Traditional & Other Products	46,147	8,353	54,500
Total	\$540,396	\$126,504	\$666,900

(In thousands)	2016		
	Network Solutions	Services & Support	Total
Access & Aggregation	\$339,451	\$96,921	\$436,372
Subscriber Solutions & Experience ⁽¹⁾	130,645	6,963	137,608
Traditional & Other Products	55,406	7,395	62,801
Total	\$525,502	\$111,279	\$636,781

⁽¹⁾Subscriber Solutions & Experience was formerly reported as Customer Devices. With the increasing focus on enhancing the customer experience for both our business and consumer broadband customers and the addition of SmartRG during the fourth quarter of 2018, Subscriber Solutions & Experience more accurately represents this revenue category.

The following table presents sales information by geographic area for the years ended December 31, 2018, 2017 and 2016:

(In thousands)	2018	2017	2016
United States	\$288,843	\$508,178	\$501,337
Germany	167,251	119,502	85,780
Other international	73,183	39,220	49,664
Total	\$529,277	\$666,900	\$636,781

Customers comprising more than 10% of revenue can change from year to year. Single customers comprising more than 10% of our revenue in 2018 included two customers at 27% and 17%. Single customers comprising more than 10% of our revenue in 2017 included two customers at 40% and 16%. Single customers comprising more than 10% of our revenue in 2016 included three customers at 24%, 19% and 12%. Other than those with more than 10 percent of revenues disclosed above, and excluding distributors, our next five largest customers can change from year-to-year. These customers represented 18%, 15% and 13% of total revenue in 2018, 2017 and 2016, respectively.

Additional Segment Information

As of December 31, 2018, long-lived assets, net totaled \$80.6 million, which includes \$77.3 million held in the U.S. and \$3.3 million held outside the U.S. As of December 31, 2017, long-lived assets, net totaled \$85.1 million, which includes \$80.6 million held in the U.S. and \$4.5 million held outside the U.S.

Note 15 – Commitments and Contingencies

In the ordinary course of business, we may be subject to various legal proceedings and claims, including employment disputes, patent claims, disputes over contract agreements and other commercial disputes. In some cases, claimants seek damages or other relief, such as royalty payments related to patents, which, if granted, could require significant expenditures. Although the outcome of any claim or litigation can never be certain, it is our opinion that the outcome of all contingencies of which we are currently aware will not materially affect our business, operations, financial condition, or cash flows.

We have committed to invest up to an aggregate of \$7.9 million in two private equity funds, and we have contributed \$8.4 million as of December 31, 2018, of which \$7.7 million has been applied to these commitments.

We lease office space and equipment under operating leases which expire at various dates through 2025. As of December 31, 2018, future minimum rental payments under non-cancelable operating leases, including renewals determined to be reasonably assured, with original maturities of greater than 12 months are as follows:

(In thousands)	
2019	\$3,873
2020	3,580
2021	2,771
2022	2,053
2023	1,317
Thereafter	762
Total	\$14,356

Rental expense was \$4.6 million, \$4.7 million and \$4.5 million for the years ended December 31, 2018, 2017 and 2016, respectively.

Note 16 – Earnings (Loss) per Share

A summary of the calculation of basic and diluted earnings (loss) per share for the years ended December 31, 2018, 2017 and 2016 is as follows:

(In thousands, except for per share amounts)	2018	2017	2016
Numerator			
Net Income (Loss)	\$(19,342)	\$23,840	\$35,229
Denominator			
Weighted average number of shares – basic	47,880	48,153	48,724

Effect of dilutive securities:

Stock options	—	406	170
Restricted stock and restricted stock units	—	140	55
Weighted average number of shares – diluted	\$47,880	\$48,699	\$48,949
Earnings (loss) per share – basic	\$(0.40)	\$0.50	\$0.72
Earnings (loss) per share – diluted	\$(0.40)	\$0.49	\$0.72

For each of the years ended December 31, 2018, 2017 and 2016, 2.5 million, 3.2 million and 4.6 million stock options were outstanding but were not included in the computation of diluted earnings (loss) per share because the options' exercise prices were greater than the average market price of the common shares, therefore making them anti-dilutive under the treasury stock method. As a result of the net loss for the year ended December 31, 2018, we excluded 0.1 million of unvested stock options, PSU's, RSU's and restricted stock from the calculation of diluted EPS due to their anti-dilutive effect.

Note 17 – Summarized Quarterly Financial Data (Unaudited)

The following table presents unaudited quarterly operating results for each of our last eight fiscal quarters. This information has been prepared on a basis consistent with our audited financial statements and includes all adjustments, consisting only of normal recurring adjustments, considered necessary for a fair presentation of the data.

Unaudited Quarterly Operating Results

(In thousands, except for per share amounts)

Three Months Ended	March 31, 2018	June 30, 2018	September 30, 2018	December 31, 2018
Net sales	\$ 120,806	\$ 128,048	\$ 140,335	\$ 140,088
Gross profit	\$ 39,733	\$ 49,996	\$ 58,448	\$ 55,388
Operating income (loss)	\$ (26,647)	\$ (12,813)	\$ (2,179)	\$ (3,783)
Net income (loss)	\$ (10,814)	\$ (7,670)	\$ 7,589	\$ (8,447)
Earnings (loss) per common share - basic	\$ (0.22)	\$ (0.16)	\$ 0.16	\$ (0.18)
Earnings (loss) per common share – diluted	\$ (0.22)	\$ (0.16)	\$ 0.16	\$ (0.18)

(1)

Three Months Ended	March 31, 2017	June 30, 2017	September 30, 2017	December 31, 2017
Net sales	\$ 170,279	\$ 184,673	\$ 185,112	\$ 126,836
Gross profit	\$ 73,709	\$ 84,626	\$ 86,491	\$ 58,809
Operating income (loss)	\$ 6,949	\$ 16,363	\$ 18,227	\$ (4,153)
Net income (loss)	\$ 6,651	\$ 12,401	\$ 15,898	\$ (11,110)
Earnings (loss) per common share - basic	\$ 0.14	\$ 0.26	\$ 0.33	\$ (0.23)
Earnings (loss) per common share – diluted	\$ 0.14	\$ 0.26	\$ 0.33	\$ (0.23)

(1)

(1) Assumes exercise of dilutive securities calculated under the treasury stock method.

Note 18 – Subsequent Events

On January 23, 2019, the Board declared a quarterly cash dividend of \$0.09 per common share to be paid to shareholders of record at the close of business on February 7, 2019. The quarterly dividend payment was \$4.3 million and was paid on February 21, 2019. In July 2003, our Board of Directors elected to begin declaring quarterly dividends on our common stock considering the tax treatment of dividends and adequate levels of Company liquidity.

During the first quarter and as of February 26, 2019, we have repurchased 13,000 shares of our common stock through open market purchases at an average cost of \$14.06 per share. We currently have the authority to purchase an additional 2.5 million shares of our common stock under the current plan approved by the Board of Directors.

In February 2019, \$1.0 million of an outstanding investment loan due to ADTRAN was replaced with a secured loan in that amount. The remaining balance of this investment loan was converted to participating preferred shares of the respective company.

In February 2019, we announced the restructuring of our workforce in Germany, which includes the closure of the office location in Munich, Germany accompanied by relocation or severance benefits for the affected employees and a voluntary early retirement offering to certain other employees. The restructuring is expected to be completed in the fourth quarter of 2019. ADTRAN does not have sufficient information currently on which to estimate the liability associated with this restructuring, including costs associated with employee severance and relocation.

On February 25, 2019, one of the Company's customers filed for voluntary Chapter 11 bankruptcy as a result of a court ruling resulting in a substantial legal judgment against the customer. In 2018, this customer accounted for less than 5% of the Company's revenue. As of December 31, 2018, the Company had \$2.6 million related to product and services revenue and \$0.3 million related to a leased equipment arrangement included in accounts receivable on the Consolidated Balance Sheet that was due from this customer. As of December 31, 2018, the Company had \$9.4 million included in other receivables related to a leased equipment arrangement on its Consolidated Balance Sheet that was due from this customer. Since December 31, 2018, and through the date of this filing, all \$2.6 million of the outstanding products and services accounts receivable and \$0.1 million of the outstanding accounts receivable related to leased equipment have been collected. Additionally, \$1.7 million of the outstanding other receivables related to leased equipment have been collected. Therefore, there is potential risk of uncollectibility up to \$7.8 million on the remaining outstanding receivable balances as of December 31, 2018. The Company has evaluated the collectibility of the remaining receivable balances with the best available and applicable information as of the date of this filing and the impact was not material to the consolidated financial statements as of December 31, 2018. The Company will continue to evaluate the collectibility of the remaining accounts receivable balances in subsequent reporting periods. Additionally, it is uncertain at this time the impact this voluntary bankruptcy filing might have on the Company's operating income prospectively; however, the Company believes it will not have a significant impact on the Company's liquidity and capital resources.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

- (a) *Internal control over financial reporting.* Section 404 of the Sarbanes-Oxley Act of 2002 requires management to include in this Annual Report on Form 10-K a report on management's assessment of the effectiveness of our internal control over financial reporting, as well as a report from our independent registered public accounting firm on the effectiveness of internal control over financial reporting. Management's report on internal control over financial reporting is included below and the related report from our independent registered public accounting firm is located in Item 8 "Financial Statements and Supplementary Data" of this report.
- (b) *Evaluation of disclosure controls and procedures.* Our Chief Executive Officer and Chief Financial Officer are responsible for establishing and maintaining "disclosure controls and procedures" (as defined in the Securities Exchange Act of 1934 Rules 13a-15(e) and 15d-15(e)) for the company. Our Chief Executive Officer and Chief Financial Officer, after evaluating the effectiveness of our disclosure controls and procedures as of the end of the period covered by this annual report, have concluded that our disclosure controls and procedures are effective.
- (c) *Changes in internal control over financial reporting.* There were no changes in our internal control over financial reporting that occurred during our most recent fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Management of ADTRAN, Inc. is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended. ADTRAN's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. ADTRAN's internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of ADTRAN;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of ADTRAN are being made only in accordance with authorizations of management and directors of ADTRAN; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of ADTRAN's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of ADTRAN's internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control-Integrated Framework (2013)*.

Based on our assessment and those criteria, management has concluded that ADTRAN maintained effective internal control over financial reporting as of December 31, 2018.

The effectiveness of our internal control over financial reporting has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Information relating to nominees for director of ADTRAN and compliance with Section 16(a) of the Securities Exchange Act of 1934 is set forth under the captions "Proposal 1–Election of Directors," "Section 16(a) Beneficial Ownership Reporting Compliance" and "Corporate Governance," respectively, in the Proxy Statement for the Annual Meeting of Stockholders to be held on May 8, 2019. Such information is incorporated herein by reference. The definitive Proxy Statement will be filed with the Securities and Exchange Commission no later than 120 days after December 31, 2018. Information relating to the executive officers of ADTRAN, pursuant to Instruction 3 of Item 401(b) of Regulation S-K and General Instruction G(3) of Form 10-K, is set forth at Part I, Item 4A of this report under the caption "Executive Officers of the Registrant." This information is incorporated herein by reference.

Code of Ethics

We have adopted the ADTRAN, Inc. Code of Business Conduct and Ethics, which applies to all employees, officers and directors of ADTRAN. The Code of Business Conduct and Ethics meets the requirements of a "code of ethics" as defined by Item 406 of Regulation S-K, and applies to our Chief Executive Officer, Chief Financial Officer (who is both our principal financial and principal accounting officer), as well as all other employees, as indicated above. The Code of Business Conduct and Ethics also meets the requirements of a code of conduct under NASDAQ listing standards. The Code of Business Conduct and Ethics is posted on our website at www.adtran.com under the links "About – Investor Relations – Corporate Governance – Charters and Documents – Code of Business Conduct and Ethics." We intend to disclose any amendments to the Code of Business Conduct and Ethics, as well as any waivers for executive officers or directors, on our website at www.adtran.com.

ITEM 11. EXECUTIVE COMPENSATION

Information required by this Item 11 relating to executive compensation and other matters is set forth under the captions "Executive Compensation," "Director Compensation" and "Corporate Governance" in the Proxy Statement referred to in Item 10. This information is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Information relating to ownership of common stock of ADTRAN by certain persons is set forth under the caption "Share Ownership of Principal Stockholders and Management" in the Proxy Statement referred to in Item 10 above. Such information is incorporated herein by reference. Information regarding securities authorized for issuance under equity compensation plans of ADTRAN is set forth under the caption "Equity Compensation Plan Information" in the Proxy Statement referred to in Item 10. This information is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS AND DIRECTOR INDEPENDENCE

Information relating to existing or proposed relationships or transactions between ADTRAN and any affiliate of ADTRAN is set forth under the captions "Certain Relationships and Related Transactions" and "Corporate Governance" in the Proxy Statement referred to in Item 10. This information is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

Information relating to ADTRAN's principal accountant's fees and services is set forth under the caption "Principal Accountant Fees and Services" in the Proxy Statement referred to in Item 10. This information is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

Documents Filed as Part of This Report.

1. Consolidated Financial Statements

The consolidated financial statements of ADTRAN and the report of independent registered public accounting firm thereon are set forth under Part II, Item 8 of this report.

Consolidated Balance Sheets as of December 31, 2018 and 2017

Consolidated Statements of Income for the years ended December 31, 2018, 2017 and 2016

Consolidated Statements of Comprehensive Income for the years ended December 31, 2018, 2017 and 2016

Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2018, 2017 and 2016

Consolidated Statements of Cash Flows for the years ended December 31, 2018, 2017 and 2016

Notes to Consolidated Financial Statements

2. Consolidated Financial Statement Schedule

Schedule II - Valuation and Qualifying Accounts

3. Exhibits

The following exhibits are filed with or incorporated by reference in this report. Where such filing is made by incorporation by reference to a previously filed registration statement or report, such registration statement or report is identified in parentheses. We will furnish any exhibit upon request to: ADTRAN, Inc., Attn: Investor Relations, 901 Explorer Boulevard, Huntsville, Alabama 35806. There is a charge of \$0.50 per page to cover expenses for copying and mailing.

Exhibit

Number Description

- | | |
|-----|---|
| 2.1 | <u>Asset Sale and Purchase Agreement dated 11 December 2011 Regarding the Sale and Purchase of the NSN DSLAM, GPON and ACI Products and the Related Services Businesses (Exhibit 2.1 to ADTRAN's 2011 Form 10-K/A filed July 26, 2012).</u> |
| 3.1 | Certificate of Incorporation, as amended (Exhibit 3.1 to ADTRAN's Registration Statement on Form S-1, No. 33-81062). (P) |
| 3.2 | <u>Bylaws, as amended (Exhibit 3.1 to ADTRAN's Form 8-K filed October 13, 2011).</u> |

- 10.1 Documents relative to the \$50,000,000 Taxable Revenue Bond, Series 1995 (ADTRAN, Inc. Project) issued by the Alabama State Industrial Development Authority, consisting of the following:
- (a) First Amended and Restated Financing Agreement dated April 25, 1997, among the State Industrial Development Authority, a public corporation organized under the laws of the State of Alabama (the "Authority"), ADTRAN and First Union National Bank of Tennessee, a national banking corporation (the "Bondholder") (Exhibit 10.1(a) to ADTRAN's Form 10-Q filed May 9, 1997).
 - (b) First Amended and Restated Loan Agreement dated April 25, 1997, between the Authority and ADTRAN (Exhibit 10.1(b) to ADTRAN's Form 10-Q filed May 9, 1997).
 - (c) First Amended and Restated Specimen Taxable Revenue Bond, Series 1995 (ADTRAN, Inc. Project) (Exhibit 10.1(c) to ADTRAN's Form 10-Q filed May 9, 1997).
 - (d) First Amended and Restated Specimen Note from ADTRAN to the Bondholder, dated April 25, 1997 (Exhibit 10.1(d) to ADTRAN's Form 10-Q filed May 9, 1997).
 - (e) Amended and Restated Investment Agreement dated January 3, 2002 between ADTRAN and First Union National Bank (successor-in-interest to First Union National Bank of Tennessee (the "Successor Bondholder")) (Exhibit 10.1(e) to ADTRAN's 2002 Form 10-K filed March 20, 2003).

Exhibit

Number Description

- (f) Resolution of the Authority authorizing the amendment of certain documents, dated April 25, 1997, relating to the \$50,000,000 Taxable Revenue Bond, Series 1995 (ADTRAN, Inc. Project) (Exhibit 10.1(f) to ADTRAN's Form 10-Q filed May 9, 1997).
 - (g) Resolution of ADTRAN authorizing the First Amended and Restated Financing Agreement, the First Amended and Restated Loan Agreement, the First Amended and Restated Note, and the Investment Agreement (Exhibit 10.1(g) to ADTRAN's Form 10-Q filed May 9, 1997).
 - (h) Amendment to First Amended and Restated Financing Agreement and First Amended and Restated Loan Agreement dated January 3, 2002 between ADTRAN and the Successor Bondholder (Exhibit 10.1(h) to ADTRAN's 2002 Form 10-K filed March 20, 2003).
- 10.2 Tax Indemnification Agreement dated July 1, 1994 by and among ADTRAN and the stockholders of ADTRAN prior to ADTRAN's initial public offering of Common Stock (Exhibit 10.5 to the 1994 Form 10-K). (P)
- 10.3 Management Contracts and Compensation Plans:
- (a) ADTRAN, Inc. Management Incentive Bonus Plan (Exhibit 10.1 to ADTRAN's Form 8-K filed February 3, 2006).
 - (b) ADTRAN, Inc. 2006 Employee Stock Incentive Plan (Exhibit 4.1 to ADTRAN's Registration Statement on Form S-8 (File No. 333-133927) filed May 9, 2006).
 - (c) First Amendment to the ADTRAN, Inc. 2006 Employee Stock Incentive Plan (Exhibit 10.3(h) to ADTRAN's 2007 Form 10-K filed February 28, 2008).
 - (d) Form of Nonqualified Stock Option Agreement under the 2006 Employee Stock Incentive Plan (Exhibit 10.1 to ADTRAN's Form 8-K filed June 8, 2006).
 - (e) Form of Incentive Stock Option Agreement under the 2006 Employee Stock Incentive Plan (Exhibit 10.2 to ADTRAN's Form 8-K filed June 8, 2006).
 - (f) ADTRAN, Inc. 2005 Directors Stock Option Plan and Forms of Nonqualified Stock Option Agreements (Exhibit 10.1 to ADTRAN's Form 8-K filed on May 20, 2005).
 - (g) Summary of Non-Employee Director Compensation (Exhibit 10.3(k) to ADTRAN's 2006 Form 10-K filed on February 28, 2007).
 - (h) First Amendment to the ADTRAN, Inc. 2005 Directors Stock Option Plan (Exhibit 10.3(l) to ADTRAN's 2007 Form 10-K filed February 28, 2008).
 - (i) Form of Performance Shares Agreement under the ADTRAN, Inc. 2006 Employee Stock Incentive Plan (Exhibit 10.1 to ADTRAN's Form 8-K filed November 12, 2008).

- (j) Form of Performance Shares Agreement under the ADTRAN, Inc. 2006 Employee Stock Incentive Plan (Exhibit 10.1 to ADTRAN's Form 8-K filed November 9, 2010).
- (k) ADTRAN, Inc. 2015 Employee Stock Incentive Plan (Exhibit 10.1 to ADTRAN's Form 8-K filed May 15, 2015).
- (l) ADTRAN, Inc. Deferred Compensation Program for Employees, as amended and restated as of June 1, 2010 (Exhibit 10.3(n) to ADTRAN's Form 10-K filed February 24, 2016).
- (m) ADTRAN, Inc. Deferred Compensation Program for Directors, as amended and restated as of June 1, 2010 (Exhibit 10.3(o) to ADTRAN's Form 10-K filed February 24, 2016).
- (n) ADTRAN, Inc. Equity Deferral Program for Employees, as amended and restated as of October 1, 2011 (Exhibit 10.3(p) to ADTRAN's Form 10-K filed February 24, 2016).
- (o) ADTRAN, Inc. Equity Deferral Program for Directors, as amended and restated as of October 1, 2011 (Exhibit 10.3(q) to ADTRAN's Form 10-K filed February 24, 2016).
- (p) Employment Agreement, dated October 29, 2015, between Roger Shannon and ADTRAN, Inc. (Exhibit 10.3(r) to ADTRAN's Form 10-K filed February 24, 2016).

Exhibit

<u>Number</u>	<u>Description</u>
21*	<u>Subsidiaries of ADTRAN.</u>
23*	<u>Consent of PricewaterhouseCoopers LLP.</u>
24*	<u>Powers of Attorney.</u>
31*	<u>Rule 13a-14(a)/15d-14(a) Certifications.</u>
32*	<u>Section 1350 Certifications.</u>
101.INS	XBRL Instance Document- the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.LAB	XBRL Taxonomy Extension Labels Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document

* Filed herewith

ITEM 16. FORM 10-K SUMMARY

None.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized on February 28, 2019.

ADTRAN, Inc.

(Registrant)

By: /s/ Roger D. Shannon
Roger D. Shannon
Senior Vice President of Finance,
Chief Financial Officer, Corporate Secretary and Treasurer
(Principal Accounting Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities indicated on February 28, 2019.

<u>Signature</u>	<u>Title</u>
/s/ Thomas R. Stanton Thomas R. Stanton	Chief Executive Officer and Chairman of the Board
/s/ H. Fenwick Huss* H. Fenwick Huss	Director
/s/ William L. Marks* William L. Marks	Director
/s/ Gregory McCray* Gregory McCray	Director
/s/ Anthony Melone* Anthony Melone	Director
/s/ Balan Nair* Balan Nair	Director
/s/ Roy J. Nichols* Roy J. Nichols	Director
/s/ Jacqueline H. Rice* Jacqueline H. Rice	Director
/s/ Kathryn A. Walker* Kathryn A. Walker	Director

*By: /s/ Roger D. Shannon
Roger D. Shannon as Attorney in Fact

ADTRAN, INC.

SCHEDULE II

VALUATION AND QUALIFYING ACCOUNTS

	Balance at	Charged to		Balance
	Beginning	Costs &		at
(In thousands)	of Period	Expenses	Deductions	End of
				Period
Year ended December 31, 2018				
Allowance for Doubtful Accounts	\$ —	128	—	\$128
Inventory Reserve	\$ 23,355	7,006	352	\$30,009
Warranty Liability	\$ 9,724	7,392	8,493	\$8,623
Deferred Tax Asset Valuation Allowance	\$ 6,006	—	190	\$5,816
Year ended December 31, 2017				
Allowance for Doubtful Accounts	\$ —	—	—	\$—
Inventory Reserve	\$ 25,249	6,406	8,300	\$23,355
Warranty Liability	\$ 8,548	6,951	5,775	\$9,724
Deferred Tax Asset Valuation Allowance	\$ 6,149	18	161	\$6,006
Year ended December 31, 2016				
Allowance for Doubtful Accounts	\$ 19	—	19	\$—
Inventory Reserve	\$ 26,675	3,303	4,729	\$25,249
Warranty Liability	\$ 8,739	8,561	8,752	\$8,548
Deferred Tax Asset Valuation Allowance	\$ 7,250	69	1,170	\$6,149