

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

- ☒ ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the Fiscal Year Ended December 31, 2019
- ☐ 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)
901 Explorer Boulevard
Huntsville, Alabama 35806-2807
(Address of principal executive offices, including zip code)

63-0918200
(I.R.S. Employer Identification Number)
(256) 963-8000
(Registrant's telephone number, including area code)

Title of each class
Common Stock, Par Value \$0.01

Securities registered pursuant to Section 12(b) of the Act:
Trading Symbol(s)
ADTN

Name of each exchange on which registered
The 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 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, 2019 was \$724,323,806 based on a closing market price of \$15.25 as reported on the NASDAQ Global Select Market (as of June 28, 2019, the most recent trading day prior to June 30, 2019). There were 48,086,618 shares of common stock outstanding as of February 21, 2020.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the Annual Meeting of Stockholders to be held on May 13, 2020 are incorporated herein by reference in Part III.

ADTRAN, Inc.
Annual Report on Form 10-K
For the Fiscal Year Ended December 31, 2019

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CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

The Private Securities Litigation Reform Act of 1995 provides a safe harbor for forward-looking statements made by or on behalf of ADTRAN, Inc. ("ADTRAN", the "Company", "we", "our" or "us"). ADTRAN and its representatives may from time to time make written or oral forward-looking statements, including statements contained in this report, our other filings with the Securities and Exchange Commission (the "SEC") and other communications with our stockholders. Any statement that does not directly relate to a historical or current fact is a forward-looking statement. 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 affect the accuracy of such statements. For a detailed description of the risk factors associated with our business, see Part I, Item 1A of this report. 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 a combination of factors, may have on our business. You are further cautioned not to place undue reliance on these forward-looking statements because they speak only of our views as of the date that 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.

GLOSSARY OF SELECTED TERMS

Below are certain acronyms, concepts and defined terms commonly used in our industry and in this Annual Report on Form 10-K, along with their meanings:

Acronym/Concept/ Defined Term	Meaning
10G EPON	10-Gigabit EPON (as defined below)
10G PON	10-Gigabit PON (as defined below)
ADSL	Asymmetric Digital Subscriber Line
APAC	Asia Pacific
ATIS	Alliance for Telecommunications Industry Solutions; Standards organization that develops technical and operational standards and solutions for the information and technology industry
ATM	Asynchronous Transfer Mode
BBF	Broadband Forum
CAD/CAM	Computer-Aided Design/Computer-Aided Manufacturing
carrier	Entity that provides voice, data or video services to consumers and businesses
CLEC	Competitive Local Exchange Carrier
CPE	Customer-Premises Equipment
CSP	Communication Service Provider
C-TPAT	U.S. Customs Trade Partnership Against Terrorism
DOCSIS	Data Over Cable Service Interface Specification
DPU	Distribution Point Unit
DSL	Digital Subscriber Line
EMEA	Europe, Middle East and Africa
EPON	Ethernet Passive Optical Network
Ethernet	Means of connecting computers over a LAN (as defined below)
ETSI	European Telecommunications Standards Institute
EU	European Union
FCC	Federal Communications Commission
FSAN	Full Service Access Network
FTTB	Fiber to the Building
FTTdp	Fiber to the Distribution Point
FTTH	Fiber to the Home
FTTN	Fiber to the Node
FTTP	Fiber to the Premises
FTTx	Fiber to the x; Any broadband network architecture using optical fiber to provide all or part of the local loop used for last mile telecommunications
GDPR	General Data Protection Regulation
Gfast	A digital subscriber line protocol standard for local loops (telephone lines) shorter than 500 meters with performance targets between 100 Mbps (as defined below) and 1 gigabit per second, depending on loop length
GPON	Gigabit Passive Optical Network
HDSL	High-bit-rate Digital Subscriber Line
hiX	ADTRAN Multiservice Access Platform sold in the EU
ICT	Information and Communications Technology

IoT	Internet of Things
IP	Internet Protocol
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
LAN	Local Area Network
LATAM	Latin America
LTE	4G mobile communications standard; Long-Term Evolution
Mbps	Megabits per second
MDU	Multi-Dwelling Unit (apartment building, condominium, etc.)
MEF	Metro Ethernet Forum
micro-node	Small fixed access nodes that use VDSL2 and Gfast to deliver ultra-broadband services to a small number of end users
mmWave	Millimeter wave
MSAN	Multi-Service Access Network
MSO	Multiple System Operator
MSP	Managed Service Provider
NFV	Network Functions Virtualization
NG-PON2	Next-Generation Passive Optical Network 2
OCF	Open Compute Project
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
OLT	Optical Line Terminal
ONE	Optical Networking Edge
ONF	Open Networking Foundation
ONT	Optical Network Terminal
Operator	An entity that provides voice, data or video services to consumers and businesses
OS	Operating System
OSP	Outside Plant
OTT	Over the Top
PON	Passive Optical Network
QSFP	Quad Small Form-factor Pluggable
REACH	Registration, Evaluation, Authorization, and Restriction of Chemicals
RFoG	Radio Frequency over Glass
RoHS	Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment
RSP	Regional Service Provider
SaaS	Software-as-a-Service
SD-Access	Software Defined Access
SDN	Software Defined Networking
SDX	Software Defined Everything
SDO	Standards Developing Organizations
SEBA	SDN-Enabled Broadband Access
SEC	Securities and Exchange Commission
Service Provider	An entity that provides voice, data or video services to consumers and businesses

SFP	Small Form-factor Pluggable
SFP+	Enhanced Small Form-factor Pluggable
SI	System Integrator
SLA	Service Level Agreement
SmartOS	Smart Operating System used on SmartRG, Inc. devices
SP	Service Provider
Symmetrical	The ability to carry traffic both upstream and downstream simultaneously.
System Integrator	Person or company that specializes in bringing together component subsystems into a whole and ensuring that those subsystems function together
TDM	Time Division Multiplexed
TIA	Telecommunications Industry Association
TIP	Telecom Infra-Project
TL 9000	Standard developed by and for the ICT industry to drive consistency in the quality of products and services down the supply chain through the implementation of a common body of QMS requirements and defined performance-based measurements
U.K.	United Kingdom
U.S.	United States
VAR	Value-Added Reseller
VDSL2	Very high-speed Digital Subscriber Line 2
vWLAN	Virtual Wireless Local Area Network
VoIP	Voice over Internet Protocol
WAN	Wide Area Network
web-scale	The ability of large cloud software-based service firms, such as Google, Amazon, Netflix, Facebook, to achieve extreme levels of network agility and scalability when developing and delivering new features and services to their own operations or their customer base
WEEE	Waste Electrical and Electronic Equipment; European Community Directive 2012/19/EU on waste electrical and electronic equipment
WFA	Wi-Fi Alliance
xDSL	All types of digital subscriber lines
XFP	10 Gigabit Small Form-factor Pluggable
XGS-PON	Updated standard for Passive Optical Networks that can support 10 Gbps symmetrical data transfer

ITEM 1. BUSINESS***Company Overview***

ADTRAN, Inc. (“ADTRAN” or the “Company”) is a leading global provider of networking and communications solutions and services. Our vision is to enable a fully connected world where the power to communicate is available to everyone, everywhere. Our unique approach, unmatched industry expertise and innovative solutions enable us to address almost any customer need. Our products and services are utilized by a diverse global customer base of network operators that range from those having national or regional reach, operating as telephone or cable television network operators, to alternative network providers such as municipalities or utilities, as well as managed service providers who serve small- and medium-sized businesses and distributed enterprises.

We operate in two business segments: (1) Network Solutions, which includes hardware and software products, and (2) Services & Support, which includes a portfolio of services that complement our product portfolio. These two segments span across our three revenue categories: (1) Access & Aggregation, (2) Subscriber Solutions & Experience and (3) Traditional & Other Products. A revenue category is distinguished by the types of products and services offered. Access & Aggregation is focused on solutions that are used by service providers to connect their network infrastructure to subscribers; Subscriber Solutions & Experience is concentrated on subscriber solutions that terminate broadband access in the home and/or business; and Traditional & Other Products encompasses prior-generation technologies, products and services and certain other offerings. See below for a detailed discussion of these reportable segments and revenue categories.



Our innovative solutions and services enable voice, data and video communications across a variety of network infrastructures. They are currently in use by millions of end users worldwide, making us a top supplier of broadband access solutions in both the North American and the EMEA regions.

We are focused on being a top supplier of communications infrastructure spanning from the cloud edge (data center) to the subscriber edge (subscriber device) serving both the residential internet and enterprise cloud services markets. We offer a broad portfolio of flexible network infrastructure solutions, customer premises equipment software, management and orchestration solutions and global services and support including network implementation, system integration and network maintenance and management services that enable service providers to meet their service demands now and in the future. These products and services enable service providers to transition to a common network supporting the simplified delivery of high-capacity services, regardless of subscriber density, network topology and infrastructure diversity.

ADTRAN was incorporated in 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. No information contained on our website is intended to be included as part of, or incorporated by reference into, this Annual Report on Form 10-K.

Industry Overview

Communications solution providers are investing in their networks for growth in subscriber acquisition and retention, while streamlining their operations to reduce costs and complexity. Drivers for this network investment include the evolution of government funding programs, regulatory broadband policies, competition, increasing subscriber demand for broadband and merger obligations.

Subscriber demand for higher bandwidth continues to increase due to increasing numbers of connected devices, OTT video, the prevalence of IoT and cloud services and the increasing use of internet applications. Today, practically everything is or can be “connected.” Performance is directly related to bandwidth availability. As the demand for high-definition video streaming services, low-latency cloud gaming services and smart home video surveillance applications continues to increase, so too does the need for higher bandwidth to the home and business. ADTRAN serves as a trusted partner to our customers. Working side-by-side with our customers, we enable them to glean the maximum performance from their network, providing a flexible path for their networks to evolve cost effectively, and to further monetize their investments.

Our Strategy

Our strategy is to provide innovative and cost-effective solutions for SPs that enable them to address their increasing broadband demands. Our solutions focus on technology transformations that are happening in broadband network infrastructure, home and business CPE and software solutions, and services needed to help our customers address increasing complexity while scaling to meet increasing consumer demands. We aspire to be one of the top communication technology players in the world and plan to achieve this goal through innovation in network, home and business technology, leadership in open source solutions, disruptive and unique products timed to market use, diversifying our customer base, delivering end to end product and service solutions, evolving our organization to be more flexible and agile, effective cost management, expanding our global scale and growing our share of home and business devices during Wi-Fi and cloud service technology transformations.

Reportable Segments

Our business operates under two reportable segments: (1) Network Solutions and (2) Services & Support. We review our financial performance, specifically revenue and gross profit, based on these two segments.

Network Solutions Segment

Our Network Solutions segment includes hardware and software products that support fiber optic-, copper- and coaxial-based infrastructures as well as a growing number of fixed wireless solutions. We offer traditional chassis-based network solutions, such as the ADTRAN Total Access 5000 and ADTRAN hiX 5600. We are also accelerating the industry’s transition to open, programmable and scalable SD-Access networks by providing CSPs with open and disaggregated network elements leveraging open-source software and reference designs that we have helped drive over the last several years.

Our SD-Access architecture consists of the ADTRAN Mosaic™ Cloud Platform and the ADTRAN SDX Series of programmable network elements. Together, these solutions provide network operators with a highly agile and scalable networking architecture.

Also included in this segment are our subscriber solutions that terminate fiber optic, copper and coaxial cable access networks in the home and/or business and that extend access through our delivery of whole-home Wi-Fi solutions. These solutions also include connected home and enterprise software platforms that improve in-home visibility while leveraging subscriber insight and network analytics. These solutions are designed to elevate subscriber experience and empower customer care personnel, all leading to improving overall customer satisfaction and creating added revenue streams for the network operator.

Services & Support Segment

To complement our Network Solutions product 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 services include consulting, solutions integration, network implementation, maintenance and professional and managed services as described below.

Our consulting services allow service providers to leverage ADTRAN’s network engineering expertise to build and deploy best-of-breed networks. Our NetAssure Program offers a variety of ways to leverage ADTRAN networking expertise applied to networks. One aspect of this program, 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 network operators to gain a strategic competitive advantage from our products.

Our solution integration services enable network operators to design and build the open distributed access networks of the future. Our offerings in this area include the SD-Access Accelerator, which enables 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 a SEBA solution. This fully functional SD-Access system enables network operators to cost-effectively perform functional testing, develop transition plans, access a variety of applications and environments and evaluate fully functional disaggregated solutions.

Our network implementation services enable network operators to increase service delivery velocity and improve their return on investment while increasing customer satisfaction. ADTRAN offers a full turn-key suite of services to help network operators accelerate network deployment. We partner with our 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. Element management is an option and can be included as part of the support plan.

ADTRAN's ProServices include a full spectrum of professional services for end-user customers or network operators reselling to end-user customers. This 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 Wi-Fi services). Our ProCare program, which is available to all customers, is geared towards equipment located at the customer premises. It offers advanced hardware replacement and priority access to our product support engineers.

In addition to these professional services, we offer managed services to help customers manage their network components on a day-to-day basis. Our EliteCloud Plus service provides managed Wi-Fi with configuration changes, outage alerts, and on-site support with SLAs. For our Tier-3 service providers, we offer cloud-based device management services for day-to-day control of residential gateways and subscriber home analytics. In December 2019, we released a Network Performance Testing service to assist any network operator with FCC-mandated testing and reporting in support of the Connect America programs.

Revenue Categories

In addition to classifying our operations into two reportable segments, we report revenue across three categories of products and services: (1) Access & Aggregation, (2) Subscriber Solutions & Experience (formerly Customer Devices) and (3) Traditional & Other Products.

Our Access & Aggregation solutions are used by communications service providers to connect their network infrastructure to subscribers. This revenue category includes hardware- and software-based products and services that aggregate and/or originate access technologies. ADTRAN solutions within this category include a wide array of modular or fixed platforms designed to deliver the best technology and economy based on subscriber density and environmental conditions.

The Access & Aggregation category includes the following product and service families:

•Total Access 5000 Series FTTP and FTTN MSANs	•SDX Series of SDN-controlled programmable network elements that form the hardware components within SD-Access architectures
•hiX 5600 Series fiber aggregation and FTTN MSANs	•ADTRAN ONE branded packet optical transport solutions used for broadband and Ethernet services aggregation and/or metro transport.
•FTTdp Gfast DPUs	•IP-based DSLAMs
•Mosaic-branded network management and subscriber services control and orchestration software within SD-Access architectures	•Cabinet and OSP enclosures and services
•Planning, engineering, program management, maintenance, installation and commissioning services to implement customer network solutions	•SFP, SFP+, XFP, QSFP transceivers, cables and other miscellaneous materials
•All technology varieties of PON OLTs used in conjunction with the ADTRAN family of ONTs or select third-party ONTs.	•Other products and services that are generally applicable to Access & Aggregation

Our Subscriber Solutions & Experience portfolio is used by service providers to terminate their access services infrastructure at the customer premises while providing an immersive and interactive experience for the subscriber. These solutions include copper and fiber WAN termination, LAN switching, Wi-Fi access and cloud software services for both residential and business markets.

In alignment with our increased focus on enhancing the customer experience for both business and consumer broadband customers as well as the addition of SmartRG, Inc. (“SmartRG”) at the end of 2018, what was previously known as our Customer Devices category became our Subscriber Solutions & Experience category in 2019, as this more accurately represents this revenue category and our vision moving forward.

The Subscriber Solutions & Experience category includes the following products, software and services:

•Broadband customer premises solutions, including GPON, XGS-PON, NG-PON2, EPON and 10G EPON and point-to-point Ethernet ONTs	•SmartRG Wi-Fi-enabled residential gateway products and accessories across xDSL, Ethernet, DOCSIS, LTE, and fiber technologies
•NetVanta Ethernet switches for reliable multi-gigabit local area networking	•Intellifi (access points working together to form one unified, whole-home Wi-Fi network)
•SmartOS-branded embedded software licensing for residential gateway and Wi-Fi devices	•Bluesocket access points and vWLANs for business-class Wi-Fi and management
•Mosaic cloud-based SaaS management platform for service providers to manage residential and enterprise networks	•ProServices pre-sale and post-sale technical support
•RFoG micro-nodes	•Planning, engineering, program management, maintenance, installation and commissioning services to implement customer devices solutions into consumer, small business and enterprise locations
•Mosaic cloud-based SaaS management platform for subscriber and network analytics collection used to enhance network operations and customer experience	•NetVanta Ethernet switches for reliable multi-gigabit local area networking
•Other products, software and services applicable to Subscriber Solutions & Experience	

Our Traditional & Other Products category generally includes a mix of prior-generation technologies’ products and services, as well as other products and services that do not fit within the other revenue categories.

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

•TDM and 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

Customers

We have a diverse global customer base that includes Tier-1, -2 and -3 service providers, alternative service providers, such as utilities, municipalities and fiber overbuilders, cable/MSOs, SMBs and distributed enterprises. Many network operators require product approval before the purchase or installation of a product. The nature of our business involves a dynamic process of submitting new and succeeding generations of products for approval prior to orders being placed.

Three customers, CenturyLink, Inc., Deutsche Telekom, AG and Telmex, individually comprised more than 10% of our revenue in 2019. Additionally, our revenues in Germany and Mexico comprised more than 10% of our revenue in 2019. 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 CLEC market could result in a significant decrease in our revenue," in Part I, Item 1A of this report.

Distribution, Sales and Marketing

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

Before placing an order, 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.

Orders for end-user products are fulfilled through a combination of direct sales and distributors. 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 SIs 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 offices worldwide to support direct sales, distributors, MSPs, VARs and SIs.

Outside of the U.S., 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.

Our marketing organization promotes all brands associated with ADTRAN to key stakeholders, including customers, partners and prospects throughout the world. Marketing is complemented by product marketing and management teams that work with our engineering teams to develop and promote new products and services as well as product enhancements.

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 ability to grow.

Our product development activities are an important part of our strategy. We plan to maintain our emphasis on product development to enable us 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 at our Huntsville, Alabama headquarters and in Germany, India and other locations worldwide. During the years ended December 31, 2019, 2018 and 2017, research and development expenditures totaled \$126.2 million, \$124.5 million and \$130.7 million, respectively.

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

As we continue to create more software-based intellectual property, such as our SDN/NFV portfolio, our use of lean agile practices in research and development ensures we remain responsive and customer-focused. This enables us to deliver products faster and more economically to our customers and the market on a continuous basis.

Our ability to continually reduce product costs, while focusing on 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, access routing, Ethernet switching, wireless LANs, 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, 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 SDOs. These SDOs consist of representatives from various manufacturers, service providers and testing laboratories who work 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.

Our SDO activities are primarily in the area of broadband access. This includes involvement with the ITU-T, ATIS, ETSI and the BBF. We are involved in the evolution of optical access technologies, participating in activities in the ITU-T, FSAN 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 in the ITU-T. 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 MEF, OCP, WFA, TIA, CableLabs, Quest Forum and TIP.

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 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 effort and which may focus on more leading edge development,” in Part I, 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 that 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 products and build and test product prototypes and many of our initial production units at our manufacturing site in Huntsville, Alabama. 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 U.S. 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, when possible. The majority of our products shipped to 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 C-TPAT certified. Our products are also certified to certain other customer, industry and privacy standards, including those relating to emission of electromagnetic energy and safety specifications as well as GDPR.

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 Part I, 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. In our Access & Aggregation category, key competitors include Calix, Casa Systems, Ciena, CommScope, DASAN Zhone Solutions, Huawei, Nokia and ZTE. In the Subscriber Solutions & Experience category, our primary competitors include Calix, Cisco, CommScope, Hewlett Packard Enterprise, Ribbon Communications, 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 Calix, Ericsson, Fujitsu Network Communications and Nokia.

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 Part I, Item 1A of this report.

Seasonality

We have experienced quarterly fluctuations in customer activity due to seasonal considerations. These seasonal effects may continue to 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

Transactions with customers that are denominated in foreign currencies are recorded using the appropriate 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 and our Australian subsidiary, whose functional currency is the Australian 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 nonbinding 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, 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 be considered excess and/or obsolete. This excess and obsolete inventory may require us to write down the value of the 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 Part I, 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 the RoHS directive, the WEEE directive and the REACH regulation. We continue to implement measures to comply with these directives and other similar directives and regulations from additional countries.

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 GDPR requirements, which protect digital data for all EU citizens, and to other applicable data protection laws. Additionally, ADTRAN holds a Privacy Shield certification providing adequate protection for the transfer of personal data from the EU to the U.S.

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.” and “Risk Factors – 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.” in Part I, Item 1A of this report.

Employees

As of December 31, 2019, we had 1,790 full-time employees in the U.S. and our international subsidiaries located in North America, Latin America, EMEA and the APAC regions. Approximately 76% of employees of ADTRAN GmbH are subject to collective bargaining agreements of either the Association of Metal and Electrical Industry in Berlin and Brandenburg e.V. or NORMMETALL Association of Metal and Electrical Industry e.V. Additionally, a small number of our ADTRAN GmbH employees are represented by other collective bargaining agreements. Although these collective bargaining agreements expire during the next twelve months, 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, as is the name “ADTRAN” and the “SmartRG” trademark. We also claim rights to a number of unregistered trademarks.

We own over 600 patents worldwide related to our products and over 90 additional pending patent applications. Our patents expire at various dates between 2020 and 2038. We 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. We have received, 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 such 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 Part I, Item 1A of this report.

Information about our Executive Officers

Set forth below, in accordance with General Instruction G(3) of Form 10-K and the Instruction to Item 401 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, 2019.

Thomas R. Stanton 2007 to present	Age 55 Chief Executive Officer and Chairman of the Board
Michael K. Foliano 2019 to present 2006 to 2019	Age 59 Senior Vice President of Finance and Chief Financial Officer Senior Vice President of Operations
Ronald D. Centis 2019 to present 2018 – 2019 2015 – 2017	Age 57 Senior Vice President of Operations President and Chief Operating Officer – Fastback Networks Executive Vice President and General Manager CenturyLink – Ericsson
Raymond Harris 2018 to present 2017 – 2018 2010 – 2017 2008 – 2010	Age 56 Chief Information Officer Director High-Performance Computing – Johns Hopkins University Applied Physics Lab Vice President and Chief Information Officer – Iron Bow Technologies LLC Chief Information Security Engineer – Johns Hopkins University Applied Physics Lab
Marc Kimpe 2019 to present 2014 – 2019	Age 50 Senior Vice President of Research and Development Vice President of Research and Development
Jeffery F. McInnis 2018 to present 2012 – 2018 2011 – 2012	Age 53 Senior Vice President of Subscriber Solutions & Experience President and Chief Executive Officer – SmartRG, Inc. Vice President - ClearAccess
Eduard Scheiterer 2015 to present 2014 – 2015 2012 – 2014 2009 – 2012	Age 66 Senior Vice President of Research and Development Senior Vice President and Managing Director of International Markets Managing Director – ADTRAN GmbH, a German wholly owned subsidiary of ADTRAN, Inc. Head of Broadband Access – Nokia (formerly Nokia Siemens Networks), Germany
Daniel T. Whalen 2019 to present 2016 – 2019 2013 – 2016	Age 51 Chief Product Officer President of Network and Cloud - ARRIS Senior Vice President and General Manager of Global Sales - ARRIS
James D. Wilson, Jr. 2019 to present 2015 – 2019 2006 – 2015	Age 49 Chief Revenue Officer Senior Vice President of Technology and Strategy Senior Vice President and General Manager of Carrier Networks

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

Availability of Information

We file annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K, proxy statements and other information as required with the SEC. The SEC maintains an Internet website, www.sec.gov, that contains reports, proxy and information statements, and other information regarding issuers, including ADTRAN, that file electronically with them. Additionally, our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports, if applicable, filed or furnished pursuant to Section 13(a) or 15(d) of the Securities and Exchange Act of 1934, as amended, are available free of charge under the Investor Relations section of our website, www.adtran.com, as soon as reasonably practicable after we electronically file them with, or furnish them to, the 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 report.

ITEM 1A. RISK FACTORS

Our business involves substantial risks. Any of the risk factors described below or elsewhere in this report could significantly and adversely affect our business prospects, financial condition and results of operations. The risks described below are not the only ones facing us. Additional risks and uncertainties not presently known to us or that we currently deem to be immaterial may also adversely affect us.

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 related 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 report, could have a material adverse effect on our business, results of operations, financial condition and cash flows 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 in the 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 flows.

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 flows.

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 flows.

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;
- excess and 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 flows.

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 flows.

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 EU's 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. For example, California's Consumer Privacy Act becomes effective in 2020, providing new data privacy rights for consumers and new operational requirements for companies. New and changing laws, regulations and 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 flows.

A material weakness in our internal control over financial reporting could, if not remediated, materially adversely affect us.

Section 404 of the Sarbanes-Oxley Act of 2002 ("Section 404") requires us to include in our Annual Reports on Form 10-K an assessment by the Company's management 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 our internal control over financial reporting. We must perform system and process evaluation and testing of our internal control over financial reporting to allow management and our independent registered public accounting firm to report on the effectiveness of our internal control over financial reporting, as required by Section 404. Our compliance with Section 404 may require that we incur substantial accounting expense and expend significant management efforts. In addition, if management or our independent registered public accounting firm is unable to conclude 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.

As further described in Part II, Item 9A of this report, and as reported in our Annual Report on Form 10-K for the year ended December 31, 2018 (as amended) and our Quarterly Reports on Form 10-Q for the quarterly periods ended June 30, 2019 and September 30, 2019, management previously concluded that certain material weaknesses in our internal control over financial reporting existed as of December 31, 2018 and continued through September 30, 2019. Specifically, management determined that controls were not effectively designed, documented and maintained to verify that the existence of all inventories subject to our cycle count program were included and counted at the frequency required under the Company's internal policies, and that the key reports and related data used to monitor the results of this program were not validated to ensure completeness and accuracy. Furthermore, management determined that controls were not effectively designed and maintained over the determination of the estimated reserve for excess and obsolete inventory, including the review of significant inputs and assumptions used to determine our excess and obsolete inventory reserve, and to ensure the completeness and accuracy of key reports and related data used in the calculation of this reserve.

Management has been working to further strengthen the Company's internal controls relating to inventory. Specifically, as discussed in Item 9A of this Annual Report on Form 10-K, the Company has redesigned, enhanced and added certain controls and procedures to ensure the completeness of our cycle count program and the completeness and accuracy of key reports and related data used to monitor the results of this cycle count program. As a result of these remediation efforts, management has determined that, as of December 31, 2019, our controls related to our cycle count program were effectively designed, documented and maintained, and the material weakness related to these controls no longer existed.

Additionally, as discussed in Item 9A of this Annual Report on Form 10-K, the Company has been working to redesign and implement enhanced controls and procedures related to the review of significant inputs and assumptions used to determine our excess and obsolete inventory reserve, and to ensure the completeness and accuracy of key reports and related data used in the calculation of the excess and obsolete inventory reserve. The implementation of these measures is ongoing, and, while we believe that they will ultimately be effective in remediating the material weakness, management has concluded that, as of December 31, 2019, our controls related to our excess and obsolete inventory reserve were not effectively designed and maintained, and the material weakness related to these controls continued to exist.

Our initiatives to remediate this material weakness related to our excess and obsolete inventory reserve or any other material weakness in our internal control over financial reporting identified in the future may not prove successful, and management may not be able to conclude that our internal control over financial reporting is effective. Furthermore, even if management were to reach a conclusion that our internal control over financial reporting is effective, if our independent registered public accounting firm is not satisfied with the adequacy of our controls, or if the independent registered public accounting firm interprets the requirements, rules or regulations differently than we do, then they in the future may decline to issue a report on our internal control over financial reporting or may issue a report that is qualified. Any of these events could result in a loss of investor confidence in the reliability of our financial statements, which in turn could negatively affect the price of our common stock.

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 flows. 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 UK held a referendum, commonly referred to as “Brexit,” in which the majority of voters elected to withdraw from the EU. The UK formally departed from the EU on Friday, January 31, 2020, subject to a transition period expected to last until December 31, 2020 (the “Transition Period”). During the Transition Period, most EU rules and regulations will continue to apply to the UK as negotiations between the UK and the EU take place regarding the customs and trading relationship between the UK and the EU. Such negotiations are expected to continue after the expiration of the Transition Period. 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. Brexit has resulted in, and likely will continue to result in, significant volatility in the value of the British Pound Sterling and Euro currencies. 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 in this report.

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 effort and which may focus on more leading edge development.

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, reducing operational costs, increasing scale and providing 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 those technologies or market approaches will be successful or that they 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 2019, 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 flows.

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, some of 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.

Changes in trade policy in the United States and other countries, specifically China, including the imposition of additional tariffs and the resulting consequences, may adversely impact our gross profits, gross margins, results of operations and financial condition.

The U.S. government has imposed tariffs on a wide-range of products and goods manufactured in China and imported into the U.S. These tariffs are intended to address trade imbalances, which include decreasing imports from China and encouraging increased production of these products in the U.S. These proposals have, and could continue to, result in increased customs duties and tariffs. We import an increasing percentage of our products into the U.S. from China and an increase in customs duties and tariffs with respect to these imports could negatively impact our gross profit, gross margins and results of operations. These customs duties and tariffs may also cause other U.S. trading partners to take certain actions with respect to U.S. imports in their respective countries. Any potential changes in trade policies in the U.S. and the potential actions by other countries in which we do business could adversely impact our financial performance.

Our dependence on a limited number of suppliers for certain raw materials, key components and ODM products 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 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 particular, if the current novel coronavirus outbreak continues and results in a prolonged period of travel, commercial and other similar restrictions, we could experience global supply disruptions. These restrictions could disrupt our ability to receive ODM products from China and may disrupt our suppliers located elsewhere who rely on products from China. Although we have not experienced material effects from the disruptions through the date of this Annual Report on Form 10-K, if we experience additional supply disruptions, we may become dependent on alternative sources outside the region. We may not be able to develop such alternate sourcing quickly enough to avoid production delays. Any disruption of our production schedule caused by an unexpected shortage of ODM products could cause us to alter production schedules, which could cause a loss of revenues, which would adversely affect our operations.

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, our liability for warranty obligations may increase or decrease, 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 flows. 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 flows 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, that 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 flows.

We are expanding our presence in international markets, which represented 43.2% of our net sales for 2019, 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 flows 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 flows.

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 effectively implement 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 flows.

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 flows 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 flows.

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 flows.

Consolidation and deterioration in the 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 our products 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 SIs, service providers and enterprise VARs, our sales may be negatively affected.

As part of our sales strategy, we are targeting 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, 2019, 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 Part II, Item 7 of this report, “Quantitative and Qualitative Disclosures about Market Risk” in Part II, Item 7A of this report and Note 5 of Notes to the Consolidated Financial Statements in Part II, Item 8 of this report for more information about our investments.

New or revised tax regulations, changes in our effective tax rate, recognition of a valuation allowance 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. During 2019, we received 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. The credit program administered by the Alabama State Industrial Development Authority ended on January 2, 2020 with the repayment of the revenue bonds, which will result in an increased effective tax rate in the future. These 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, we continually review the adequacy of the valuation allowance and recognize 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 that 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 ongoing 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 flows 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 flows.

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 flows.

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 the U.S., 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 APAC, 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 9 of Notes to Consolidated Financial Statements included in Part II, 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 U.S. and abroad.

ITEM 3. LEGAL PROCEEDINGS

Securities Class Action Lawsuit

On October 17, 2019, a purported stockholder class action lawsuit, captioned *Burbridge v. ADTRAN, Inc. et al.*, Docket No. 19-cv-09619, was filed in the United States District Court for the Southern District of New York against the Company, two of its current executive officers and one of its former executive officers. The complaint alleges violations of federal securities laws and seeks unspecified compensatory damages on behalf of purported purchasers of ADTRAN securities between February 28, 2019 and October 9, 2019. The lawsuit claims that the defendants made materially false and misleading statements regarding, and/or failed to disclose material adverse facts about, the Company's business, operations and prospects, specifically relating to the Company's internal control over financial reporting, excess and obsolete inventory reserves, financial results and shipments to a Latin American customer. Investors in ADTRAN securities had until December 16, 2019 to move the court to serve as lead plaintiff in this action.

On December 16, 2019, two purported investors in ADTRAN securities filed motions seeking to be appointed lead plaintiff in the case. On January 6, 2020, the United States District Court for the Southern District of New York granted Defendants' unopposed request to transfer the case to the United States District Court for the Northern District of Alabama, where the case is now pending as *Burbridge v. ADTRAN, Inc. et al.*, Docket No. 5:20-cv-00050-LCB. On January 27, 2020, the two prospective lead plaintiff movants filed a stipulation among plaintiffs seeking to be appointed as co-lead plaintiffs in the case.

We disagree with the claims made in the complaint and intend to vigorously defend against this lawsuit. At this time, we are unable to predict the outcome of or estimate the possible loss or range of loss, if any, associated with this lawsuit.

Other Legal Matters

In addition to the litigation described above, from time to time we are subject to or otherwise involved in various lawsuits, claims, investigations and legal proceedings that arise out of or are incidental to the conduct of our business (collectively, "Legal Matters"), including those relating to employment matters, patent rights, regulatory compliance matters, stockholder claims, and contractual and other commercial disputes. Such Legal Matters, even if not meritorious, could result in the expenditure of significant financial and managerial resources. Additionally, an unfavorable outcome in a legal matter, including in a patent dispute, could require the Company to pay damages, entitle claimants to other relief, such as royalties, or could prevent the Company from selling some of its products in certain jurisdictions. While the Company cannot predict with certainty the results of the Legal Matters in which it is currently involved, the Company does not expect that the ultimate outcome of such Legal Matters will individually or in the aggregate have a material adverse effect on its business, results of operations, financial condition or cash flows.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

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

ADTRAN's common stock is traded on the NASDAQ Global Select Market under the symbol ADTN. As of February 19, 2020, ADTRAN had 163 stockholders of record and approximately 6,972 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
2019			
First Quarter	\$	15.40	\$ 10.49
Second Quarter	\$	17.81	\$ 13.76
Third Quarter	\$	16.40	\$ 9.92
Fourth Quarter	\$	11.59	\$ 8.09
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

Stock Repurchases

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

Period	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs ⁽¹⁾	Maximum Number of Shares that May Yet Be Purchased Under the Plans or Programs
October 1, 2019 – October 31, 2019	—	\$ —	—	2,545,430
November 1, 2019 – November 30, 2019	—	\$ —	—	2,545,430
December 1, 2019 – December 31, 2019	—	\$ —	—	2,545,430
Total	—	—	—	—

⁽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 2.5 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,

	2019	2018	2017	2016	2015
Sales	\$ 530,061	\$ 529,277	\$ 666,900	\$ 636,781	\$ 600,064
Cost of sales	310,894	325,712	363,265	345,451	333,166
Gross Profit	219,167	203,565	303,635	291,330	266,898
Selling, general and administrative expenses	130,288	124,440	135,583	131,848	123,540
Research and development expenses	126,200	124,547	130,666	124,909	129,868
Asset impairments	3,872	—	—	—	—
Gain on contingency	(1,230)	—	—	—	—
Operating Income (Loss)	(39,963)	(45,422)	37,386	34,573	13,490
Interest and dividend income	2,765	4,026	4,380	3,918	3,953
Interest expense	(511)	(533)	(556)	(572)	(596)
Net investment gain (loss)	11,434	(4,050)	4,685	5,923	10,337
Other income (expense), net	1,498	1,286	(1,208)	(489)	(1,476)
Gain on bargain purchase of a business	—	11,322	—	3,542	—
Income (Loss) Before Income Taxes	(24,777)	(33,371)	44,687	46,895	25,708
Income tax (expense) benefit	(28,205) ⁽¹⁾	14,029	(20,847) ⁽²⁾	(11,666)	(7,062)
Net Income (Loss)	\$ (52,982)	\$ (19,342)	\$ 23,840	\$ 35,229	\$ 18,646
Weighted average shares outstanding – basic	47,836	47,880	48,153	48,724	51,145
Weighted average shares outstanding – assuming dilution ⁽³⁾	47,836	47,880	48,699	48,949	51,267
Earnings (loss) per common share – basic	\$ (1.11)	\$ (0.40)	\$ 0.50	\$ 0.72	\$ 0.36
Earnings (loss) per common share – assuming dilution ⁽³⁾	\$ (1.11)	\$ (0.40)	\$ 0.49	\$ 0.72	\$ 0.36
Dividends declared and paid per common share	\$ 0.36	\$ 0.36	\$ 0.36	\$ 0.36	\$ 0.36

Balance Sheet Data

(In thousands)

As of December 31,

	2019	2018	2017	2016	2015
Working capital ⁽⁴⁾	\$ 207,599	\$ 237,416	\$ 306,296	\$ 226,367	\$ 219,219
Total assets	\$ 545,118	\$ 628,027	\$ 669,094	\$ 667,235	\$ 632,904
Total debt ⁽⁵⁾	\$ 24,600	\$ 25,600	\$ 26,700	\$ 27,800	\$ 28,900
Stockholders' equity	\$ 380,426	\$ 446,279	\$ 497,911	\$ 479,517	\$ 480,160

⁽¹⁾ Provision for income taxes in 2019 reflected a valuation allowance of \$42.8 million is primarily related to our domestic deferred tax assets with respect to which the Company is no longer able to conclude that it is more likely than not that these deferred tax assets will be realized. See Note 13 of Notes to Consolidated Financial Statements, included in Part II, 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 13 of Notes to Consolidated Financial Statements, included in Part II, 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 Part II, Item 8 of this report. As a result of the net loss for each of the years ended December 31, 2019 and 2018, we excluded 0.1 million of unvested stock options, PSUs, RSUs 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 Part II, Item 8 of this report for additional information.

⁽⁵⁾ Total debt outstanding consisted of taxable revenue bonds due to the State of Alabama Industrial Development Authority. The bonds matured on January 1, 2020 and were repaid in full on January 2, 2020. See Note 12 of Notes to Consolidated Financial Statements, included in Part II, Item 8 of this report for additional information.

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

You should read the following discussion of our financial condition and results of operations in conjunction with our audited consolidated financial statements and the related notes included in Part II, Item 8 of this Annual Report on Form 10-K. We have omitted discussion of the earliest of the three years of financial condition and results of operations and this information can be found in Part I, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" of our Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed with the SEC on February 28, 2019, which is available free of charge on the SEC's website at sec.gov and on our website at www.adtran.com.

Overview

ADTRAN is a leading global provider of networking and communications equipment, serving a diverse domestic and international customer base in multiple 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 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 grow 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. 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. In addition to our corporate headquarters in Huntsville, Alabama, we have research and development facilities in strategic global locations.

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.

We ended the first half of 2019 with 20.6% year-over-year revenue growth and good geographical diversity with 50.8% of our revenue coming from international markets. During the third quarter of 2019, we experienced a slowdown in capital spending by a Tier-1 customer in Europe and an unforeseen pause in spending from a LATAM Tier-1 customer. While shipments to the LATAM customer resumed in the fourth quarter, these delays, combined with seasonality, resulted in a softer than expected second half of the year. During 2019, we had three 10% revenue customers geographically diversified with one each in the U.S., Europe and LATAM. Our domestic revenue growth of 4.2% year-over-year was driven by an increase in sales to RSPs and additional fiber deployments across all customers. In addition, we saw an increase in sales to a Tier-1 customer with diversified business among our fiber access and CPE, service provider CPE and services as well as sales to a Tier-2 customer. Our LATAM Tier-1 customer expanded their FTTx deployments in 2019 with ADTRAN solutions. In Europe, a Tier-1 customer continued expansion of their vectoring and super-vectoring VDSL2 solutions. We also experienced increases in our service provider CPE business in 2019. Among our customers, we made progress with our fiber and fiber-extension solutions, including Gfast and PON, while also continuing to engage various Services & Support opportunities that we expect will contribute in 2020 and beyond. In addition, we believe we are at the beginning of a significant investment cycle for fiber deployment driven by technology advancements, regulatory influences and vendor disruption. The transition to next-generation network architectures is beginning, and we are seeing demand for our next-generation SD-Access solutions. In the latter part of 2020, we anticipate that payments to service providers under government funding programs such as the FCC Rural Digital Opportunity Fund will begin and continue into 2021.

We made two acquisitions in 2018, strengthening our position in both the cable/MSOs and connected home markets. In the first quarter of 2018, we acquired Sumitomo Electric Lightwave Corp.'s North American EPON business and certain assets for North America and entered into a technology license and original equipment manufacturer supply agreement with Sumitomo Electric Industries, Ltd. These solutions, combined with our organic fiber access product portfolio and our distributed access expertise, present new opportunities in the cable/MSO market. Also, in the fourth quarter of 2018, we acquired U.S.-based SmartRG, an industry-leading provider of carrier-class, connected-home software platforms and cloud services for broadband service providers. 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.

In addition to classifying our operations into two reportable segments, we report revenue across three categories of products and services – (1) Access & Aggregation, (2) Subscriber Solutions & Experience (formerly Customer Devices) and (3) Traditional & Other Products.

Our Access & Aggregation solutions are used by CSPs to connect their network infrastructure to subscribers. This revenue category includes hardware- and software-based products and services that aggregate and/or originate access technologies. ADTRAN solutions within this category include a wide array of modular or fixed platforms designed to deliver the best technology and economy based on subscriber density and environmental conditions.

Our Subscriber Solutions & Experience portfolio is used by service providers to terminate their infrastructure at the customers premises while providing an immersive and interactive experience for the subscriber. These solutions include copper and fiber WAN termination, LAN switching, Wi-Fi access, and cloud software services, for both residential and business markets.

In alignment with our increased focus on enhancing the customer experience for both business and consumer broadband customers as well as the addition of SmartRG during 2018, what was previously known as our Customer Devices category became our Subscriber Solutions & Experience category, as this more accurately represents this revenue category and our vision moving forward.

Our Traditional & Other Products category generally includes a mix of prior-generation technologies' products and services, as well as other products and services that do not fit within the other revenue categories.

Our operating results have fluctuated, and may continue to fluctuate, on a quarterly basis 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 a varying order backlog and limited 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. During 2019, the Company implemented restructuring plans to realign its expense structure with the reduction in revenue experienced in recent years and with overall Company objectives. Management assessed the efficiency of our operations and consolidated locations and personnel, among other things, and has implemented certain cost savings initiatives, where possible. We expect to see a reduction in our operating expenses, both in the U.S. and internationally, as a result of our implementation of these restructuring plans.

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 19 of Notes to Consolidated Financial Statements, included in Part II, Item 8 of this report, for additional information on quarterly results for 2018 and 2019. For a discussion of risks associated with our operating results, see Part I, Item 1A of this report.

Results of Operations

The following table presents selected financial information derived from our Consolidated Statements of Income (Loss) expressed as a percentage of sales for the years indicated. Amounts may not foot due to rounding.

	Year Ended December 31,		
	2019	2018	2017
Sales			
Network Solutions	85.9%	86.6%	81.0%
Services & Support	14.1	13.4	19.0
Total sales	100.0	100.0	100.0
Cost of sales			
Network Solutions	49.7	52.7	41.9
Services & Support	8.9	8.8	12.6
Total cost of sales	58.7	61.5	54.5
Gross profit	41.3	38.5	45.5
Selling, general and administrative expenses	24.6	23.5	20.3
Research and development expenses	23.8	23.5	19.6
Asset impairments	0.7	—	—
Gain on contingency	(0.2)	—	—
Operating income (loss)	(7.5)	(8.6)	5.6
Interest and dividend income	0.5	0.8	0.7
Interest expense	(0.1)	(0.1)	(0.1)
Net investment gain (loss)	2.2	(0.8)	0.7
Other income (expense), net	0.3	0.2	(0.2)
Gain on bargain purchase of a business	—	2.1	—
Income (Loss) Before Income Taxes	(4.7)	(6.3)	6.7
Income tax (expense) benefit	(5.3)	2.7	(3.1)
Net income (loss)	(10.0)%	(3.7)%	3.6%

The following discussion and financial information are presented to aid in an understanding of our current consolidated financial position, changes in financial position, results of operations and cash flows and should be read in conjunction with the audited Consolidated Financial Statements and notes thereto included herein. The emphasis of the discussion is a comparison of the years ended December 31, 2019 and December 31, 2018. For a discussion of a comparison of the years ended December 31, 2018 and December 31, 2017, please refer to Management's Discussion and Analysis of Financial Condition and Results of Operations included in our Annual Report on Form 10-K for the year ended December 31, 2018, filed with the SEC on February 28, 2019.

Comparison of Years Ended December 31, 2019 and December 31, 2018

Sales

Our sales increased 0.1% from \$529.3 million for the year ended December 31, 2018 to \$530.1 million for the year ended December 31, 2019. Our Services & Support sales increased \$3.8 million compared to 2018 and our Network Solutions sales decreased \$3.0 million versus the prior year. The increase in our 2019 sales was primarily attributable to an increase in Subscriber Solutions & Experience sales of \$18.5 million, partially offset by decreases in Access & Aggregation sales of \$10.0 million and Traditional & Other Products sales of \$7.7 million.

Network Solutions sales decreased by 0.7% from \$458.2 million in 2018 to \$455.2 million in 2019, due primarily to a decrease in sales of our Access & Aggregation products and Traditional & Other Products. The decrease in sales of 3.9% of our Access & Aggregation products for 2019 was primarily attributable to decreased FTTN products, offset by an increase in sales of Gfast DPUs. The increase of 12.1% in 2019 for sales of our Subscriber Solutions & Experience products was primarily attributable to increased residential CPE and fiber CPE sales, partially offset by a decrease in sales of SP Business CPE and Wi-Fi access points and infrastructure. 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 5.3% from \$71.0 million in 2018 to \$74.8 million in 2019. The increase in sales for 2019 was primarily attributable to an increase in network installation and maintenance services for Access & Aggregation products and Subscriber Solutions & Experience.

Domestic sales increased 4.2% from \$288.8 million in 2018 to \$300.9 million in 2019. Our domestic growth was driven by an increase in sales to the RSP market segment and additional fiber deployments across all customers. In addition, such growth was driven by an increase in sales to a Tier-1 customer with diversified business among our fiber access and CPE, service provider CPE and services, as well as increased sales to a Tier-2 customer.

International sales, which are included in the amounts for the Network Solutions and Services & Support segments amounts discussed above, decreased 4.7% from \$240.4 million for the year ended December 31, 2018 to \$229.2 for the year ended December 31, 2019. International sales, as a percentage of total sales, decreased from 45.4% for the year ended December 31, 2018 to 43.2% for the year ended December 31, 2019. The decrease in international sales for 2019 was primarily attributable to the slowdown in shipments to two international Tier-1 customers.

Our international revenue is largely focused on broadband infrastructure and is affected by the decisions of our customers as to 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. The competitive landscape in certain international markets is also affected by the increased presence of Asian manufacturers that seek to compete aggressively on price. Our revenue and operating income in some international markets can be negatively impacted by a strengthening U.S. dollar. 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 negative pressure on revenue and operating income.

Cost of Sales

As a percentage of sales, cost of sales decreased from 61.5% for the year ended December 31, 2018 to 58.7% for the year ended December 31, 2019. The decrease was primarily attributable to regional revenue shifts, changes in customer and product mix, changes in services and support mix and a decrease in labor expense as a result of restructuring programs which were initiated in 2018 and continued throughout 2019.

Network Solutions cost of sales, as a percent of that segment's sales, decreased from 60.9% of sales in 2018 to 57.9% of sales in 2019. The decrease in Network Solutions cost of sales as a percentage of that segment's sales was primarily attributable to regional revenue shifts, changes in customer and product mix and a decrease in labor expense due to restructuring programs which were initiated in 2018 and continued throughout 2019, offset by an increase in freight and shipping charges.

An important part of our strategy is to reduce the cost of each succeeding generation of product 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. 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 65.8% of sales in 2018 to 63.1% of sales in 2019. The decrease in Services & Support cost of sales as a percentage of that segment's sales in 2019 was primarily attributable to lower fixed personnel costs due to restructuring programs which were initiated in 2018 and continued throughout 2019, changes in customer mix, changes in services support mix and an increase in volume.

Our Services & Support revenue is 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 in the long-term. 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 subcontracted 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 revenue grew to become the largest component of our Services & Support segment 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 segment revenue comprising a larger percentage of our overall revenue, and because our Services & Support segment gross margins are generally below those of the Network Solutions segment, our overall corporate gross margins may decline as that business continues 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 as a percentage of sales increased from 23.5% for the year ended December 31, 2018 to 24.6% for the year ended December 31, 2019. 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.

Selling, general and administrative expenses increased by 4.7% from \$124.4 million for the year ended December 31, 2018 to \$130.3 million for the year ended December 31, 2019. 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 increase in selling, general and administrative expenses was primarily attributable to deferred compensation related costs, incremental expenses as a result of the SmartRG acquisition, IP litigation and other legal related costs, partially offset by decreases in labor expense and use tax expense.

Research and Development Expenses

Research and development expenses as a percentage of sales increased from 23.5% for the year ended December 31, 2018 to 23.8% for the year ended December 31, 2019. 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.

Research and development expenses increased by 1.3% from \$124.5 million for the year ended December 31, 2018 to \$126.2 million for the year ended December 31, 2019. The increase in research and development expenses was primarily attributable to increases in incremental expenses as a result of the SmartRG acquisition and lease expense offset by a decrease in labor expense, certain material engineering costs and contract services.

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.

Asset Impairments

Asset impairments, which were \$3.9 million for the year ended December 31, 2019, relate to the abandonment of certain information technology implementation projects which we had previously capitalized costs for these projects. There were no asset impairments recognized during the year ended December 31, 2018. See Note 1 and Note 8 of Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information.

Gain on Contingency

Gain on contingency, which was \$1.2 million for the year ended December 31, 2019, relates to the reversal of contingent liabilities which were initially recognized upon the acquisition of SmartRG in the fourth quarter of 2018. See Note 2 of the Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information. There was no gain on contingency recognized during the year ended December 31, 2018.

Interest and Dividend Income

Interest and dividend income decreased by 31.3% from \$4.0 million for the year ended December 31, 2018 to \$2.8 million for the year ended December 31, 2019. The decrease in interest and dividend income was primarily attributable to a decrease in interest income. Our investments increased from \$112.1 million as of December 31, 2018 to \$127.7 million as of December 31, 2019.

Interest Expense

Interest expense, which is primarily related to our taxable revenue bond, remained constant at \$0.5 million for the years ended December 31, 2019 and 2018, 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 (Loss)

We recognized a net investment loss of \$4.0 million for the year ended December 31, 2018 and a net investment gain of \$11.4 million for the year ended December 31, 2019. The fluctuation in our net investment gain was primarily attributable to changes in fair value of equity securities recognized during the period. 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 Part II, Item 8 of this report for additional information.

Other Income (Expense), net

Other income (expense), net, which is comprised primarily of miscellaneous income, gains and losses on foreign currency transactions, net periodic pension costs, investment account management fees and gains and losses on foreign exchange forward contracts, increased 16.5% from income of \$1.3 million for the year ended December 31, 2018 to income of \$1.5 million for the year ended December 31, 2019. The change was primarily attributable to a gain on a life insurance recovery recognized in 2019 partially offset by losses on foreign exchange contracts and transactions in 2019 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. in March 2018. See Note 2 of Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information.

Income Tax (Expense) Benefit

Our effective tax rate increased from a benefit of 42.0%, excluding the tax effect of the bargain purchase gain, for the year ended December 31, 2018 to an expense of (113.9%) for the year ended December 31, 2019. The increase in the effective tax rate between the two periods was primarily driven by the establishment of a valuation allowance against our domestic deferred tax assets in the amount of \$42.8 million during the year ended December 31, 2019, offset by a 15.5% rate reduction related to the generation of federal research and development credits, and a 16.7% rate reduction for the generation of foreign tax credits. See Note 13 of the Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information.

Net Loss

As a result of the above factors, our net loss increased from \$19.3 million for the year ended December 31, 2018 to a net loss of \$53.0 million for the year ended December 31, 2019. As a percentage of sales, net loss increased from 3.7% for the year ended December 31, 2018 to 10.0% for the year ended December 31, 2019.

Liquidity and Capital Resources*Liquidity*

We have historically and we currently expect to finance our ongoing business with existing cash and cash flow from operations. We have used, and expect to continue to use, existing cash and 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, expansion of our sales and marketing activities and capital expenditures. 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.

As of December 31, 2019, cash on hand was \$73.8 million and short-term investments were \$33.2 million, which resulted in available short-term liquidity of \$107.0 million, of which \$52.3 million was held by our foreign subsidiaries. As of 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. The decrease in short-term liquidity from December 31, 2018 to December 31, 2019 was primarily attributable to the use of cash for operating, investing and financing activities and income tax payments, offset by the reclassification of our certificate of deposit from long-term to short-term investments.

Operating Activities

Our working capital, which consists of current assets less current liabilities, decreased 12.6% from \$237.4 million as of December 31, 2018 to \$207.6 million as of December 31, 2019. The current ratio, defined as current assets divided by current liabilities, decreased from 3.01 as of December 31, 2018 to 2.84 as of December 31, 2019. The decrease in our working capital and current ratio was primarily attributable to a decrease in cash and cash equivalents, net accounts receivable and other receivables as described below. The quick ratio, defined as cash and cash equivalents, short-term investments, and net accounts receivable, divided by current liabilities, decreased from 1.76 as of December 31, 2018 to 1.75 as of December 31, 2019. The decrease in the quick ratio was primarily attributable to a decrease in cash and cash equivalents and net accounts receivable. This decrease was offset by an increase in short-term investments.

Net accounts receivable decreased 8.91% from \$99.4 million as of December 31, 2018 to \$90.5 million as of December 31, 2019. Our allowance for doubtful accounts was \$0.1 million as of December 31, 2018 and \$38 thousand as of December 31, 2019. Quarterly accounts receivable DSO increased from 65 days as of December 31, 2018 to 72 days as of December 31, 2019. The decrease in net accounts receivable and increase in DSO was attributable to the timing of sales in the fourth quarter, customer specific payment terms and other collections during the quarter.

Other receivables decreased 54.9% from \$36.7 million as of December 31, 2018 to \$16.6 million as of December 31, 2019. The decrease in other receivables was primarily attributable to a decrease in current lease payments receivable related to our sales-type leases, income tax receivables and purchasing shipments.

Annual inventory turnover increased from 2.93 turns as of December 31, 2018 to 3.14 turns as of December 31, 2019. Inventory decreased 1.6% from \$99.8 million as of December 31, 2018 to \$98.3 million as of December 31, 2019. 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 excess inventory.

Accounts payable decreased 25.3% from \$60.1 million as of December 31, 2018 to \$44.9 million as of December 31, 2019. 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 \$9.5 million, \$8.1 million and \$14.7 million for the years ended December 31, 2019, 2018 and 2017, respectively. These expenditures were primarily used to purchase computer hardware, software, manufacturing and test equipment and for building improvements.

Our combined short-term and long-term investments increased \$15.7 million from \$112.1 million as of December 31, 2018 to \$127.7 million as of December 31, 2019. This increase reflects the increase in fair market value of our equity investments.

We invest all available cash not required for immediate use in operations primarily in securities that we believe bear minimal risk of loss. See Note 5 of Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information. As of December 31, 2019, 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 1.71 years with an average credit rating of AA. 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 \$108.8 million as of December 31, 2018 to \$94.5 million as of December 31, 2019. Long-term investments as of December 31, 2018 included an investment in a certificate of deposit of \$25.6 million, which served as collateral for our revenue bonds. This certificate of deposit was included in short-term investments as of December 31, 2019, as these bonds matured on January 1, 2020, and were repaid in full on January 2, 2020. We also have investments in various marketable equity securities classified as long-term investments with a fair market value of \$35.8 million and \$27.0 million, as of December 31, 2019 and December 31, 2018, respectively. Long-term investments as of December 31, 2019 and 2018 also included \$21.7 million and \$18.3 million, respectively, related to our deferred compensation plan, and \$0.3 million and \$0.4 million, respectively, of other investments, consisting of interests in two private equity funds.

No businesses were acquired during the year ended December 31, 2019. Acquisition of businesses, net of cash acquired, totaled \$22.0 million for the year ended December 31, 2018. See Note 2 of Notes to Consolidated Financial Statements included in Part II, 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 (the "Taxable Revenue Bonds") and loaned the proceeds from the sale of the Taxable Revenue Bonds to ADTRAN. Further advances on the Taxable Revenue Bonds were made by the Authority, bringing the total amount outstanding to \$50.0 million. The bonds matured on January 1, 2020, and the current outstanding balance of \$24.6 million was repaid in full on January 2, 2020. We were required to make payments to the Authority in amounts necessary to pay the interest on the Taxable Revenue Bonds which totaled \$1.0 million, \$1.1 million and \$1.1 million, respectively, for the years ended December 31, 2019, 2018 and 2017. See Note 12 of Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information.

Dividends

During 2019, 2018 and 2017, we paid shareholder dividends totaling \$17.2 million, \$17.3 million and \$17.4 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 2019, 2018 and 2017.

Dividends per Common Share				
	2019	2018	2017	
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 ended December 31, 2019, 2018 and 2017, we repurchased 13 thousand shares, 1.0 million shares and 0.9 million shares, respectively, for \$0.2 million, \$15.5 million and \$17.3 million, respectively, at an average price of \$14.06, \$15.52 and \$20.27 per share, respectively. We currently have authorization to repurchase an additional 2.5 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 34 thousand shares of treasury stock for \$0.5 million during the year ended December 31, 2019, 0.1 million shares of treasury stock for \$1.5 million during the year ended December 31, 2018 and 0.7 million shares of treasury stock for \$13.4 million during the year ended December 31, 2017.

Employee Pension Plan

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 defined benefit plan assets consist of a balanced portfolio of equity funds, bond funds, real estate funds and managed futures. 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. At December 31, 2019, the estimated fair market value of our defined benefit pension plans assets increased to \$28.0 million from \$24.2 million at December 31, 2018.

The defined benefit pension plan is accounted for on an actuarial basis, which requires the use 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. 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 projected benefit obligation for our defined benefit pension plans was \$43.9 million and \$37.2 million as of December 31, 2019 and 2018, respectively.

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, 2019, 2018 and 2017 was \$3.2 million, \$6.1 million and \$(0.2) million, respectively.

Actuarial gains and losses are recorded in accumulated other comprehensive income (loss). 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 \$0.8 million will be amortized from accumulated other comprehensive income (loss) into net periodic pension cost in 2020 for the net actuarial loss. The net actuarial loss recognized in accumulated other comprehensive income (loss) as of December 2019 and 2018 was \$(13.0) million and \$(11.3) million, respectively.

See Note 14 of Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information.

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.

Contractual Obligations

We have various contractual obligations and commercial commitments. The following table sets forth the annual payments we are required to make under contractual cash obligations and other commercial commitments as of December 31, 2019:

<i>(In thousands)</i>	Total	2020	2021	2022	2023	2024	After 2024
Bonds payable ⁽¹⁾	\$ 24,600	\$ 24,600	\$ —	\$ —	\$ —	\$ —	\$ —
Purchase obligations ⁽²⁾	99,210	98,324	759	83	28	16	—
Operating lease obligations ⁽³⁾	8,879	2,856	2,412	1,705	1,160	482	264
Totals	\$ 132,689	\$ 125,780	\$ 3,171	\$ 1,788	\$ 1,188	\$ 498	\$ 264

⁽¹⁾ As of December 31, 2019, we were required to make payments necessary to pay the interest on the Taxable Revenue Bonds, which were outstanding in the aggregate principal amount of \$24.6 million as of December 31, 2019. The bonds had an interest rate of 2% per annum and matured on January 1, 2020. Included in short-term investments as of December 31, 2019 was a certificate of deposit of \$25.6 million, which served a collateral deposit against the principal amount of the bonds. See Note 12 of Notes to Consolidated Financial Statements included in Part II, Item 8 of this report for additional information.

⁽²⁾ Primarily relates to open purchase orders to our contract manufacturers, component suppliers, service partners and other vendors.

⁽³⁾ Primarily relates 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, 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.

Certain contracts, customers and/or jurisdictions in which we do business require us to provide various guarantees of performance such as bid bonds, performance bonds and customs bonds. As of December 31, 2019, we had commitments related to these bonds totaling \$9.3 million, which expire at various dates through August 2024. Although the triggering events vary from contract to contract, in general we would only be liable for the amount of these guarantees in the event of default in our performance under each contract, the probability of which we believe is remote.

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 13 of Notes to Consolidated Financial Statements included in Part II, 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. Several accounting policies, as described in Note 1 of Notes to the Consolidated Financial Statements included in Part II, Item 8 of this report, require material subjective or complex judgment and have a significant impact on our financial condition and results of operations, as applicable. We believe the following critical accounting policies affect our more significant judgments and estimates used in the preparation of our Consolidated Financial Statements:

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, 2019, 2018 and 2017 we recognized revenue of \$1.7 million, \$13.7 million and \$16.5 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 Sheets. 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. Standard costs for material, labor, and manufacturing overhead are used to value inventory and are updated at least a quarterly. Any variances are expensed in the current period, therefore, our inventory costs approximate actual costs at the end of each reporting period. We establish reserves for estimated excess and obsolete inventory equal to the difference between the cost of the inventory and the estimated net realizable value of the inventory based on estimated reserve percentages, which consider historical usage, known trends, inventory age and marketing conditions. If actual trends and 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 \$34.1 million and \$30.0 million at December 31, 2019 and 2018, respectively. Inventory disposals charged against the reserve were \$1.8 million, \$0.4 million and \$8.3 million for the years ended December 31, 2019, 2018 and 2017, 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 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 by-pass a qualitative assessment 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 and, in turn, performed a step-1 analysis of goodwill. Based on the results of our step-1 analysis, no impairment charges on goodwill were recognized during the years ended December 31, 2019, 2018 and 2017.

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. We continually review the adequacy of our valuation allowance and recognize 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 realized in accordance with ASC 740, *Income Taxes* (ASC 740). Due to our recent decrease in revenue and profitability for 2019, and all other positive and negative objective evidence considered as part of our analysis, our ability to consider other subjective evidence such as projections for future growth is limited when evaluating whether our deferred tax assets will be realized. As such, the Company is no longer able to conclude that it is more likely than not that our domestic deferred tax assets will be realized and a valuation allowance against our Domestic deferred tax assets was established in the third quarter of 2019. The amount of the deferred tax assets considered realizable, however, could be adjusted in future periods in the event sufficient evidence is present to support a conclusion that it is more likely than not that all or a portion of our domestic deferred tax assets will 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.

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 \$8.4 million and \$8.6 million at December 31, 2019 and 2018, 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 \$15.9 million and \$13.1 million at December 31, 2019 and 2018, respectively. This liability is included in pension liability in the accompanying Consolidated Balance Sheets.

Recently Issued Accounting Pronouncements

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

Subsequent Events

On January 2, 2020, we paid off the outstanding balance of \$24.6 million of the Taxable Revenue Bonds upon their maturity. We used a certificate of deposit which was held as collateral to repay the outstanding balance.

On February 5, 2020, 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 20, 2020. The quarterly dividend payment will be paid on March 5, 2020 in the aggregate amount of approximately \$4.3 million. 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.

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, 2019, \$71.6 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, 2019, approximately \$39.0 million of our cash and investments may be directly affected by changes in interest rates. As of December 31, 2019, we held \$3.7 million of cash and variable-rate investments where a change in interest rates would impact our interest income. A hypothetical 50 basis points ("bps") decline in interest rates, assuming all other variables remain constant, as of December 31, 2019 would reduce annualized interest income on our cash and investments by approximately \$19 thousand. In addition, we held \$35.3 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, assuming all other variables remain constant, as of December 31, 2019 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, and our Australian subsidiary, whose functional currency is the Australian dollar. Our revenue is primarily denominated in the respective functional currency of the subsidiary and paid in that subsidiary's functional currency or certain other local currency, our global supply chain predominately invoices us in the respective functional currency of the subsidiary and is paid in U.S. dollars and some of our operating expenses are invoiced and paid in certain local currencies (approximately 13% of total operating expense for the year ended December 31, 2019). Therefore, our revenues, gross margins, operating expense and operating income are all subject to foreign currency fluctuations. As a result, changes in currency exchange rates could cause variations in our operating income.

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 \$1.2 million if the U.S. dollar weakened or strengthened 10% against the billing currencies. This change represents a decrease in the amount of hypothetical gain or loss compared to prior periods and is mainly due to a decrease in U.S. dollar-denominated billings in a non-U.S. dollar denominated subsidiary. 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, 2019, we had certain material contracts subject to currency revaluation, including accounts receivable, accounts payable and lease liabilities denominated in foreign currencies. As of December 31, 2019, we did not have any 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, 2019, see Notes 5 and 6 of Notes to Consolidated Financial Statements included in Part II, 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, 2019 and 2018, and the related consolidated statements of income (loss), comprehensive income (loss), changes in stockholders’ equity and cash flows for each of the three years in the period ended December 31, 2019, 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, 2019, 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, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company did not maintain, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO because a material weakness in internal control over financial reporting existed as of that date related to ineffective controls over the Company’s determination of its estimated reserve for excess and obsolete inventory.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis. The material weakness referred to above is described in Management’s Report on Internal Control over Financial Reporting appearing under Item 9A. We considered this material weakness in determining the nature, timing, and extent of audit tests applied in our audit of the 2019 consolidated financial statements, and our opinion regarding the effectiveness of the Company’s internal control over financial reporting does not affect our opinion on those consolidated financial statements.

Basis for Opinions

The Company’s management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in management’s report referred to above. 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.

Critical Audit Matters

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (i) relates to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Excess and Obsolete Inventory Reserve

As described in Notes 1 and 7 to the consolidated financial statements, the Company's consolidated net inventory and inventory reserves as of December 31, 2019 were \$98.3 million and \$34.1 million, respectively. Management establishes reserves for estimated excess and obsolete inventory equal to the difference between the cost of the inventory and the estimated net realizable value of the inventory based on estimated reserve percentages, which consider historical usage, known trends, inventory age, and market conditions.

The principal considerations for our determination that performing procedures relating to the excess and obsolete inventory reserve is a critical audit matter are there was significant judgment by management in estimating the excess and obsolete inventory reserve, which in turn led to a high degree of auditor judgment, subjectivity and effort in performing procedures and evaluating the reasonableness of the significant assumptions used in developing the reserve, including the estimated reserve percentages. As described in the "Opinions on the Financial Statements and Internal Control over Financial Reporting" section, a material weakness was identified as of December 31, 2019 related to ineffective controls over the Company's determination of its estimated reserve for excess and obsolete inventory.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included, among others, testing management's process for developing the excess and obsolete inventory reserve; evaluating the appropriateness of the approach; testing the completeness and accuracy of underlying data used in the approach, including historical usage and inventory age; and evaluating the reasonableness of the estimated reserve percentages used by management to determine the excess and obsolete inventory reserve. Evaluating the reasonableness of the estimated reserve percentages involved assessing whether they were consistent with the historical data and evidence obtained in other areas of the audit.

/s/ PricewaterhouseCoopers LLP
Birmingham, Alabama
February 25, 2020

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

Financial Statements
ADTRAN, INC.
Consolidated Balance Sheets
(In thousands, except per share amount)
December 31, 2019 and 2018

ASSETS	2019	2018
Current Assets		
Cash and cash equivalents	\$ 73,773	\$ 105,504
Short-term investments	33,243	3,246
Accounts receivable, less allowance for doubtful accounts of \$38 and \$128 as of December 31, 2019 and 2018, respectively	90,531	99,385
Other receivables	16,566	36,699
Inventory, net	98,305	99,848
Prepaid expenses and other current assets	7,892	10,744
Total Current Assets	320,310	355,426
Property, plant and equipment, net	73,708	80,635
Deferred tax assets, net	7,561	37,187
Goodwill	6,968	7,106
Intangibles, net	27,821	33,183
Other assets	14,261	5,668
Long-term investments	94,489	108,822
Total Assets	\$ 545,118	\$ 628,027
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current Liabilities		
Accounts payable	\$ 44,870	\$ 60,054
Bonds payable	24,600	1,000
Unearned revenue	11,963	17,940
Accrued expenses and other current liabilities	13,876	11,746
Accrued wages and benefits	13,890	14,752
Income tax payable, net	3,512	12,518
Total Current Liabilities	112,711	118,010
Non-current unearned revenue	6,012	5,296
Pension liability	15,886	13,086
Deferred compensation liability	21,698	18,256
Other non-current liabilities	8,385	2,500
Bonds payable	—	24,600
Total Liabilities	164,692	181,748
Commitments and contingencies (see Note 16)		
Stockholders' Equity		
Common stock, par value \$0.01 per share; 200,000 shares authorized; 79,652 shares issued and 48,020 shares outstanding as of December 31, 2019 and 79,652 shares issued and 47,751 shares outstanding as of December 31, 2018	797	797
Additional paid-in capital	274,632	267,670
Accumulated other comprehensive loss	(16,417)	(14,416)
Retained earnings	806,702	883,975
Less treasury stock at cost: 31,638 and 31,901 shares as of December 31, 2019 and 2018, respectively	(685,288)	(691,747)
Total Stockholders' Equity	380,426	446,279
Total Liabilities and Stockholders' Equity	\$ 545,118	\$ 628,027

See accompanying notes to consolidated financial statements.

ADTRAN, INC.
Consolidated Statements of Income (Loss)
(In thousands, except per share amounts)
Years ended December 31, 2019, 2018 and 2017

	2019	2018	2017
Sales			
Network Solutions	\$ 455,226	\$ 458,232	\$ 540,396
Services & Support	74,835	71,045	126,504
Total Sales	530,061	529,277	666,900
Cost of Sales			
Network Solutions	263,677	278,929	279,563
Services & Support	47,217	46,783	83,702
Total Cost of Sales	310,894	325,712	363,265
Gross Profit	219,167	203,565	303,635
Selling, general and administrative expenses	130,288	124,440	135,583
Research and development expenses	126,200	124,547	130,666
Asset impairments	3,872	—	—
Gain on contingency	(1,230)	—	—
Operating Income (Loss)	(39,963)	(45,422)	37,386
Interest and dividend income	2,765	4,026	4,380
Interest expense	(511)	(533)	(556)
Net investment gain (loss)	11,434	(4,050)	4,685
Other income (expense), net	1,498	1,286	(1,208)
Gain on bargain purchase of a business	—	11,322	—
Income (Loss) Before Income Taxes	(24,777)	(33,371)	44,687
Income tax (expense) benefit	(28,205)	14,029	(20,847)
Net Income (Loss)	\$ (52,982)	\$ (19,342)	\$ 23,840
Weighted average shares outstanding – basic	47,836	47,880	48,153
Weighted average shares outstanding – diluted	47,836	47,880	48,699
Earnings (loss) per common share – basic	\$ (1.11)	\$ (0.40)	\$ 0.50
Earnings (loss) per common share – diluted	\$ (1.11)	\$ (0.40)	\$ 0.49

See accompanying notes to consolidated financial statements.

ADTRAN, INC.
Consolidated Statements of Comprehensive Income (Loss)
(In thousands)
Years ended December 31, 2019, 2018 and 2017

	2019	2018	2017
Net Income (loss)	\$ (52,982)	\$ (19,342)	\$ 23,840
Other Comprehensive Income (Loss), net of tax			
Net unrealized gains (losses) on available-for-sale securities	279	(3,130)	2,163
Defined benefit plan adjustments	(1,185)	(3,755)	731
Foreign currency translation	(1,480)	(4,236)	5,999
Other Comprehensive Income (Loss), net of tax	(2,386)	(11,121)	8,893
Comprehensive Income (Loss), net of tax	\$ (55,368)	\$ (30,463)	\$ 32,733

See accompanying notes to consolidated financial statements.

ADTRAN, INC.
Consolidated Statements of Changes in Stockholders' Equity
(In thousands)
Years ended December 31, 2019, 2018 and 2017

	Common Shares	Common Stock	Additional Paid-In Capital	Retained Earnings	Treasury Stock	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
Balance as of 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 (\$0.09 per share)	—	—	—	(17,368)	—	—	(17,368)
Dividends accrued on unvested restricted stock units	—	—	—	(37)	—	—	(37)
Stock options exercised	—	—	—	(2,827)	16,239	—	13,412
PSUs, RSUs and restricted stock vested	—	—	—	(3,257)	2,816	—	(441)
Purchase of treasury stock	—	—	—	—	(17,348)	—	(17,348)
Stock-based compensation expense	—	—	7,433	—	—	—	7,433
ASU 2016-09 adoption	—	—	125	(115)	—	—	10
Balance as of 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	—	—	—	278	—	—	278
ASU 2016-01 adoption	—	—	—	3,220	—	—	3,220
Other comprehensive loss, net of tax	—	—	—	—	—	(11,121)	(11,121)
Dividend payments (\$0.09 per share)	—	—	—	(17,267)	—	—	(17,267)
Dividends accrued on unvested restricted stock units	—	—	—	(7)	—	—	(7)
Stock options exercised	—	—	—	(603)	2,086	—	1,483
PSUs, RSUs and restricted stock vested	—	—	—	(4,482)	3,983	—	(499)
Purchase of treasury stock	—	—	—	—	(15,532)	—	(15,532)
Stock-based compensation expense	—	—	7,155	—	—	—	7,155
Balance as of December 31, 2018	79,652	797	267,670	883,975	(691,747)	(14,416)	446,279
Net loss	—	—	—	(52,982)	—	—	(52,982)
ASU 2016-02 adoption (see Note 1)	—	—	—	4	—	—	4
ASU 2018-02 adoption (see Note 1)	—	—	—	(385)	—	385	—
Other comprehensive loss, net of tax	—	—	—	—	—	(2,386)	(2,386)
Dividend payments (\$0.09 per share)	—	—	—	(17,212)	—	—	(17,212)
Dividends accrued on unvested restricted stock units	—	—	—	(10)	—	—	(10)
Stock options exercised	—	—	—	(208)	734	—	526
PSUs, RSUs and restricted stock vested	—	—	—	(6,480)	5,909	—	(571)
Purchase of treasury stock	—	—	—	—	(184)	—	(184)
Stock-based compensation expense	—	—	6,962	—	—	—	6,962
Balance as of December 31, 2019	79,652	\$ 797	\$ 274,632	\$ 806,702	\$ (685,288)	\$ (16,417)	\$ 380,426

See accompanying notes to consolidated financial statements.

ADTRAN, INC.
Consolidated Statements of Cash Flows
(In thousands)
Years ended December 31, 2019, 2018 and 2017

	2019	2018	2017
Cash flows from operating activities:			
Net income (loss)	\$ (52,982)	\$ (19,342)	\$ 23,840
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	17,771	15,891	15,692
Asset impairments	3,872	—	—
Amortization of net premium (discount) on available-for-sale investments	(100)	(50)	425
Net (gain) loss on long-term investments	(11,434)	4,050	(4,685)
Net (gain) loss on disposal of property, plant and equipment	67	67	(145)
Gain on bargain purchase of a business	—	(11,322)	—
Gain on contingency payment	(1,230)	—	—
Gain on life insurance proceeds	(1,000)	—	—
Stock-based compensation expense	6,962	7,155	7,433
Deferred income taxes	30,070	(17,257)	14,073
Change in operating assets and liabilities:			
Accounts receivable, net	8,282	49,200	(49,103)
Other receivables	20,046	(8,522)	(10,222)
Inventory, net	1,252	24,192	(15,518)
Prepaid expenses and other assets	2,749	10,727	(4,830)
Accounts payable, net	(13,494)	(3,799)	(17,742)
Accrued expenses and other liabilities	(4,598)	(3,226)	(5,455)
Income taxes payable	(8,705)	7,690	3,858
Net cash provided by (used in) operating activities	(2,472)	55,454	(42,379)
Cash flows from investing activities:			
Purchases of property, plant and equipment	(9,494)	(8,110)	(14,720)
Proceeds from disposals of property, plant and equipment	—	—	151
Proceeds from sales and maturities of available-for-sale investments	47,268	153,649	173,752
Purchases of available-for-sale investments	(48,578)	(123,209)	(93,141)
Life insurance proceeds received	1,000	—	—
Acquisition of business, net of cash acquired	13	(22,045)	—
Net cash provided by (used in) investing activities	(9,791)	285	66,042
Cash flows from financing activities:			
Proceeds from stock option exercises	526	1,483	13,412
Purchases of treasury stock	(184)	(15,532)	(17,348)
Dividend payments	(17,212)	(17,267)	(17,368)
Payments on long-term debt	(1,000)	(1,100)	(1,100)
Net cash used in financing activities	(17,870)	(32,416)	(22,404)
Net increase (decrease) in cash and cash equivalents	(30,133)	23,323	1,259
Effect of exchange rate changes	(1,598)	(4,252)	5,279
Cash and cash equivalents, beginning of year	105,504	86,433	79,895
Cash and cash equivalents, end of year	\$ 73,773	\$ 105,504	\$ 86,433
Supplemental disclosure of cash flow information			
Cash paid during the year for interest	\$ 512	\$ 534	\$ 555
Cash paid during the year for income taxes	\$ 9,357	\$ 4,104	\$ 2,988
Supplemental disclosure of non-cash investing activities			
Purchases of property, plant and equipment included in accounts payable	\$ 90	\$ 62	\$ 408
Contingent payment	\$ —	\$ 1,230	\$ —

See accompanying notes to consolidated financial statements.

Notes to Consolidated Financial Statements

Note 1 – Nature of Business

ADTRAN, Inc. (“ADTRAN” or the “Company”) is a leading global provider of networking and communications solutions. Our vision is to enable a fully connected world where the power to communicate is available to everyone, everywhere. Our unique approach, unmatched industry expertise and innovative solutions enable us to address almost any customer need. Our products and services are utilized by a diverse global customer base of network operators that range from those having national or regional reach, operating as telephone or cable television network operators, to alternative network providers such as municipalities or utilities, as well as managed service providers who serve small- and medium-sized businesses and distributed enterprises.

Principles of Consolidation

The accompanying Consolidated Financial Statements have been prepared in accordance with accounting principles generally accepted in the U.S. (“U.S. GAAP”) and include the financial position, results of operations, comprehensive income (loss), changes in equity and cash flows of 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 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 expenses during the reporting period. Our more significant estimates include excess and obsolete 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, assessment of goodwill and other intangibles for impairment, 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.

Correction of Immaterial Misstatement

During the three months ended June 30, 2019, the Company determined that there was an immaterial misstatement of its excess and obsolete inventory reserves in its previously issued annual and interim financial statements. The Company corrected this misstatement by recognizing a \$0.8 million out-of-period adjustment during the three months ended June 30, 2019, which increased its excess and obsolete inventory reserves and cost of goods sold for the period. For the six months ended June 30, 2019, the out-of-period adjustment was a cumulative \$0.2 million reduction in the Company’s excess and obsolete inventory reserves and cost of goods sold.

Summary of Significant Accounting Policies

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, 2019, \$71.6 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 \$24.6 million, which was its fair value as of December 31, 2019.

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 recorded any losses relating to variable rate demand notes.

Long-term investments is comprised of 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 other income (expense). See Note 5 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. As of December 31, 2019, single customers comprising more than 10% of our total accounts receivable balance included four customers, which accounted for 53.2% of our total accounts receivable. As of December 31, 2018, single customers comprising more than 10% of our total accounts receivable balance included two customers, which accounted for 36.9% 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 impacting these customers 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 \$38 thousand and \$0.1 million as of December 31, 2019 and December 31, 2018, respectively.

Inventory

Inventory is carried at the lower of cost and estimated 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 and are updated at least quarterly. We establish reserves for estimated excess and obsolete inventory equal to the difference between the cost of the inventory and the estimated net realizable value of the inventory based on estimated reserve percentages, which consider historical usage, known trends, inventory age and market conditions. When we dispose of excess and obsolete inventories, the related disposals are charged against the inventory reserve. See Note 7 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 (loss). See Note 8 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 11 for additional information.

Impairment of Long-Lived Assets and Intangibles

Long-lived assets used in operations and intangible assets are reviewed 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. During the year ended December 31, 2019, we recognized an impairment loss of approximately \$3.9 million related to the abandonment of certain information technology implementation projects which we had previously capitalized expenses related to these projects. There were no impairment losses for long-lived assets during the years ended December 31, 2018 or 2017, or for intangible assets recognized during the years ended December 31, 2019, 2018 or 2017.

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 by-pass a qualitative assessment 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 and, in turn, performed a step-1 analysis of goodwill. Based on the results of our step-1 analysis, no impairment charges on goodwill were recognized during the years ended December 31, 2019, 2018 and 2017.

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. 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 \$8.4 million and \$8.6 million as of December 31, 2019 and 2018, 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, 2019, 2018 and 2017 is as follows:

<i>(In thousands)</i>	2019	2018	2017
Year Ended December 31,			
Balance at beginning of period	\$ 8,623	\$ 9,724	\$ 8,548
Plus: Amounts charged to cost and expenses	4,569	7,392	6,951
Less: Deductions	(4,798)	(8,493)	(5,775)
Balance at end of period	\$ 8,394	\$ 8,623	\$ 9,724

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 \$15.9 million and \$13.1 million as of December 31, 2019 and 2018, respectively.

Stock-Based Compensation

We have two 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. Costs related to these awards are recognized over their vesting periods. 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 and therefore are measured at fair value on their grant date.

Stock-based compensation expense recognized for the years ended December 31, 2019, 2018 and 2017 was approximately \$7.0 million, \$7.2 million and \$7.4 million, respectively. As of December 31, 2019, total unrecognized compensation cost related to non-vested stock options, PSUs, RSUs and restricted stock was approximately \$17.2 million, which is expected to be recognized over an average remaining recognition period of 3.0 years. See Note 4 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 \$126.2 million, \$124.5 million and \$130.7 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Other Comprehensive Income (Loss)

The following table presents changes in accumulated other comprehensive income (loss), net of tax, by components of accumulated other comprehensive income (loss) for the years ended December 31, 2019 2018 and 2017:

<i>(In thousands)</i>	Unrealized Gains (Losses) on Available- for-Sale Securities	Unrealized Gains (Losses) on Cash Flow Hedges	Defined Benefit Plan Adjustments	Foreign Currency Adjustments	ASU 2018-02 Adoption (2)	Total
Balance as of December 31, 2016	\$ 404	\$ —	\$ (5,017)	\$ (7,575)	\$ —	\$ (12,188)
Other comprehensive income before reclassifications	5,020	(619)	451	5,999	—	10,851
Amounts reclassified from accumulated other comprehensive loss	(2,857)	619	280	—	—	(1,958)
Balance as of December 31, 2017	2,567	—	(4,286)	(1,576)	—	(3,295)
Other comprehensive 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 loss	(595)	—	135	—	—	(460)
Balance as of December 31, 2018	(563)	—	(8,041)	(5,812)	—	(14,416)
Other comprehensive loss before reclassifications	573	—	(1,717)	(1,480)	—	(2,624)
Amounts reclassified to retained earnings (1)	—	—	—	—	385	385
Amounts reclassified from accumulated other comprehensive loss	(294)	—	532	—	—	238
Balance as of December 31, 2019	\$ (284)	\$ —	\$ (9,226)	\$ (7,292)	\$ 385	\$ (16,417)

(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* below for more information.

(2) With the adoption of ASU 2018-02 on January 1, 2019, stranded tax effects related to the Tax Cuts and Jobs Act of 2017 were reclassified to retained earnings. See Note 13 for additional information.

The following tables present the details of reclassifications out of accumulated other comprehensive income (loss) for the years ended December 31, 2019, 2018 and 2017:

(In thousands)		2019	
		Amount Reclassified from Accumulated Other Comprehensive Loss	Affected Line Item in the Statement Where Net Income Is Presented
Details about Accumulated Other Comprehensive Income Components			
Unrealized gains on available-for-sale securities:			
Net realized gain on sales of securities	\$	397	Net investment gain (loss)
Defined benefit plan adjustments – actuarial losses		(771)	(1)
Total reclassifications for the period, before tax		(374)	
Tax benefit		136	
Total reclassifications for the period, net of tax	\$	(238)	

⁽¹⁾ Included in the computation of net periodic pension cost. See Note 14 for additional information.

(In thousands)		2018	
		Amount Reclassified from Accumulated Other Comprehensive Loss	Affected Line Item in the Statement Where Net Income Is Presented
Details about Accumulated Other Comprehensive Income Components			
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 14 for additional information.

(In thousands)		2017	
		Amount Reclassified from Accumulated Other Comprehensive Loss	Affected Line Item in the Statement Where Net Income Is Presented
Details about Accumulated Other Comprehensive Income Components			
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 14 for additional information.

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, 2019, 2018 and 2017:

	2019		
	Before-Tax Amount	Tax (Expense) Benefit	Net-of-Tax Amount
<i>(In thousands)</i>			
Unrealized gains (losses) on available-for-sale securities	\$ 774	\$ (201)	\$ 573
Reclassification adjustment for amounts related to available-for-sale investments included in net loss	(397)	103	(294)
Defined benefit plan adjustments	(2,488)	771	(1,717)
Reclassification adjustment for amounts related to defined benefit plan adjustments included in net loss	771	(239)	532
Foreign currency translation adjustment	(1,480)	—	(1,480)
Total Other Comprehensive Income (Loss)	\$ (2,820)	\$ 434	\$ (2,386)

	2018		
	Before-Tax Amount	Tax (Expense) Benefit	Net-of-Tax Amount
<i>(In thousands)</i>			
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		
	Before-Tax Amount	Tax (Expense) Benefit	Net-of-Tax Amount
<i>(In thousands)</i>			
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

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 using appropriate 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 as most invoices are paid in Mexican Pesos. Adjustments resulting from translating financial statements of international subsidiaries are recorded as a component of accumulated other comprehensive income (loss).

Revenue

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. Generally, this occurs with the transfer of control of a product to the customer. Review of contracts with customers, for both direct customers and distributors, are performed and assessment made regarding principal versus agent considerations to determine primary responsibility for delivery of performance obligation, presumed inventory risk, and discretion in establishing pricing. 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. 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, if material, are capitalized and amortized over the period that the related revenue is recognized if greater than one year. We have elected to account for shipping fees as a cost of fulfilling the related contract. We have also 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.

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 as our customers benefit evenly throughout the contract term and deferred revenues, when applicable, 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 on the Consolidated Balance Sheet. The contract asset is transferred to accounts receivable when the completed performance obligation is invoiced to the customer.

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 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 performance obligations where we still have contractual obligations, we also defer the related costs. Current deferred costs are included in prepaid expenses and other current assets on the accompanying Consolidated Balance Sheets and totaled \$1.6 million and \$2.4 million as of December 31, 2019 and 2018, respectively. Non-current deferred costs are included in other assets on the accompanying Consolidated Balance Sheets and totaled \$0.1 million and \$0.8 million as of December 31, 2019 and 2018, respectively.

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 17 for additional information.

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 and liabilities assumed acquired is recorded as goodwill. If the estimated fair values of net tangible and intangible assets acquired and liabilities assumed 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 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 selling, general and administrative expenses as incurred.

Derivative Instruments and Hedging Activities

Historically, we have participated in foreign exchange forward contracts in connection with the management of exposure to fluctuations in foreign exchange rates as outlined below.

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 recorded in accumulated other comprehensive income. Amounts related to cash flow hedges are reclassified from accumulated other comprehensive income to earnings 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 earnings. 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 in 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 on the Consolidated Balance Sheets at their fair values. Our derivative instruments are not subject to master netting arrangements and are not offset on the Consolidated Balance Sheets.

Recent Accounting Pronouncements Not Yet Adopted

In June 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“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. In April 2019, the FASB issued ASU 2019-04, *Codification Improvements to Topic 326, Financial Instruments–Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments*, which clarifies the accounting for transfers between classifications of debt securities and clarifies that entities should include expected recoveries on financial assets in the calculation of the current expected credit loss allowance. In addition, renewal options that are not unconditionally cancelable should be considered in the determination of expected credit losses. In May 2019, the FASB issued ASU 2019-05, *Financial Instruments – Credit Losses (Topic 326): Targeted Transition Relief*, which amends ASU 2016-13 to allow companies, upon adoption, to elect the fair value option on financial instruments that were previously recorded at amortized cost if they meet certain criteria. In November 2019, the FASB issued ASU 2019-11, *Codification improvements to Topic 326, Financial Instruments – Credit Losses*, which makes various narrow-scope amendments to the new credit losses standard, such as, providing disclosure relief for accrued interest receivables. All of these ASUs 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 these ASUs 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 ASU 2017-04, but do not expect it will have a material effect on our consolidated financial statements.

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, *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 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 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 the effect of ASU 2018-15, but do not expect it will have a material effect on our consolidated financial statements.

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes*. The amendments in this update simplify the accounting for income taxes by removing various exceptions, such as, the exception to the incremental approach for intra-period tax allocation when there is a loss from continuing operations and income or a gain from other items. The amendments in this update, also simplify the accounting for income taxes related to income-based franchise taxes and requiring that an entity reflect enacted tax laws or rates in the annual effective tax rate computation in the interim period that includes the enactment date. ASU 2019-12 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020, with early adoption permitted. We are currently evaluating the effect of ASU 2019-12, but do not expect it will have a material effect on our consolidated financial statements.

Recently Adopted Accounting Pronouncements

During 2019, we adopted the following accounting standards, which had the following impacts on our consolidated financial statements:

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842)*, which 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 provided for an optional transition method allowing for the application of the legacy lease guidance, *Leases (Topic 840)*, 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. In March 2019, the FASB issued ASU 2019-01, *Leases (Topic 842) Codification Improvements*, which removed the requirement for an entity to disclose in the interim periods after adoption, the effect of the change on income from continuing operations, net income, any other affected financial statement line item and any affected per share amount. For lessors, the new leasing standard requires leases to be classified as sales-type, direct financing or operating leases. These criteria focus on the transfer of control of the underlying lease asset. This standard, and its related updates, were 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. At that time, the Company elected to carry forward the legacy ASC 840 disclosures for comparative periods and, therefore, did not adjust the comparative period financial information prior to January 1, 2019. In addition, the Company elected the package of practical expedients which allows for companies to not reassess whether any expired or existing contracts are or contain leases, not reassess historical lease classifications for expired or existing contracts and not reassess 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 nonlease 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 Sheets of \$10.3 million as of January 1, 2019, primarily related to our operating leases for office space, automobiles and other equipment.

As a lessee, the adoption of this standard did not have a material impact on our Consolidated Statement of Income or Statement of Cash Flows. See Note 9 for additional information.

As a lessor, the adoption of this standard did not have a material impact on our Consolidated Balance Sheet, Consolidated Statement of Income or Consolidated Statement of Cash Flows. Prior to and after adoption, all of our leases in which we are the lessor were classified as sales-type leases.

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 shortened the amortization period for the premium on certain purchased callable debt securities to the earliest call date. ASU 2017-08 was effective for fiscal years and interim periods within those fiscal years, beginning after December 15, 2018. The amendments were required to be applied through a modified-retrospective transition approach that required 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 effect 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 expanded and refined hedge accounting for both financial and non-financial risk components, aligned the recognition and presentation of the effects of hedging instruments and hedge items in the financial statements, and included certain targeted improvements to ease the application of current guidance related to the assessment of hedge effectiveness. In October 2018, the FASB issued ASU 2018-16, *Derivatives and Hedging (Topic 815): Inclusion of the Secured Overnight Financing Rate (“SOFR”) Overnight Index Swap (“OIS”) Rate as a Benchmark Interest Rate for Hedge Accounting*, which permits the OIS rate based on SOFR as a U.S. benchmark interest rate. Both ASU 2017-12 and ASU 2018-16 were effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018. The Company adopted ASU 2017-12 on January 1, 2019, and the adoption of this standard did not have a material effect on our consolidated financial statements as we did not have any hedging instruments as of the date of adoption.

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 allowed 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 was effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018. The Company adopted ASU 2018-02 on January 1, 2019, and upon adoption reclassified \$0.4 million of stranded tax effects created by rate changes related to the Tax Cuts and Jobs Act of 2017 to retained earnings.

Note 2 – Business Combinations

In November 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. 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.

Contingent liabilities with a fair value totaling \$1.2 million were recognized at the acquisition date, the payments of which were dependent upon SmartRG achieving future revenue, EBIT or customer purchase order milestones during the first half of 2019. The required milestones were not achieved and therefore, we recognized a gain of \$1.2 million upon the reversal of these liabilities during the second quarter of 2019.

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 satisfy indemnity obligations to the Company arising from any inaccuracy or breach of representations, warranties, covenants, agreements or obligations of the sellers. The escrow is subject to arbitration. In December 2019, \$1.3 million of the \$2.8 million was released from the escrow account pursuant to the agreement, with the final settlement of the remaining balance expected during the fourth quarter of 2020. The remaining minimum and maximum potential release of funds to the seller ranges from no payment to \$1.5 million.

We recorded goodwill of \$3.5 million as a result of this acquisition, which represents the excess of the purchase price over the fair value of net assets acquired and liabilities assumed. We assessed the recognition and measurement of the assets acquired and liabilities assumed based on historical and forecasted data for future periods and 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 the 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 final 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:

<i>(In thousands)</i>	Sumitomo	SmartRG
Assets		
Tangible assets acquired	\$ 1,006	\$ 8,594
Intangible assets	22,100	9,960
Goodwill	—	3,476
Total assets acquired	23,106	22,030
Liabilities		
Liabilities assumed	(3,978)	(6,001)
Total liabilities assumed	(3,978)	(6,001)
Total net assets	19,128	16,029
Gain on bargain purchase of a business, net of tax	(11,322)	—
Total purchase price	\$ 7,806	\$ 16,029

Our Consolidated Statements of Income include the following revenue and net loss attributable to SmartRG and Sumitomo since the date of acquisition:

<i>(In thousands)</i>	March 19, 2018 to December 31, 2018
Revenue	\$ 9,186
Net loss	\$ (1,297)

The details of the acquired intangible assets from the SmartRG and Sumitomo acquisitions are as follows:

<i>(In thousands)</i>	Value	Life (in 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.

<i>(In thousands)</i>	2018		2017	
Pro forma revenue	\$	559,050	\$	702,573
Pro forma net loss	\$	(33,862)	\$	33,206

For the years ended December 31, 2019 and 2018, we incurred acquisition and integration related expenses and amortization of acquired intangibles of \$5.0 million and \$2.9 million, respectively, related to the SmartRG and Sumitomo acquisitions. No acquisition expenses related to the SmartRG and Sumitomo acquisitions were recorded during the year ended December 31, 2017.

Note 3 - Revenue

The following table disaggregates our revenue by major source for the year ended December 31, 2019:

<i>(In thousands)</i>	Network Solutions		Services & Support		Total	
Access & Aggregation	\$	289,980	\$	58,894	\$	348,874
Subscriber Solutions & Experience ⁽¹⁾		144,651		8,269		152,920
Traditional & Other Products		20,595		7,672		28,267
Total	\$	455,226	\$	74,835	\$	530,061

- (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 disaggregates our revenue by major source for the year ended December 31, 2018:

<i>(In thousands)</i>	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

- (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.

Revenue allocated to remaining performance obligations represents contract revenues that have not yet been recognized for contracts with a duration greater than one year. As of December 31, 2019, 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. As a practical expedient, for certain contracts recognize revenue equal to the amounts we are entitled to invoice which correspond to the value of completed performance obligations to date. The amount related to these performance obligations was \$13.3 million as of December 31, 2018. The amount related to these performance obligations was \$13.6 million as of December 31, 2019, and the Company expects to recognize 64% of such revenue over the next 12 months with the remainder thereafter.

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

<i>(In thousands)</i>	December 31, 2019		December 31, 2018	
Accounts receivable	\$	90,531	\$	99,385
Contract assets ⁽¹⁾	\$	2,812	\$	3,766
Unearned revenue	\$	11,963	\$	17,940
Non-current unearned revenue	\$	6,012	\$	5,296

(1) Included in other receivables on the Consolidated Balance Sheets

Of the outstanding unearned revenue balance as of December 31, 2018, \$12.7 million was recognized as revenue during the year ended December 31, 2019.

Note 4 – Stock-Based Compensation

Stock Incentive Program Descriptions

In January 2006, the Board of Directors adopted the ADTRAN, Inc. 2006 Employee Stock Incentive Plan (the “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 in May 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 had a ten-year contractual term. The 2006 Plan was replaced in May 2015 by the ADTRAN, Inc. 2015 Employee Stock Incentive Plan (the “2015 Plan”). Expiration dates of options outstanding as of December 31, 2019 under the 2006 Plan range from 2020 to 2024.

In January 2015, the Board of Directors adopted the 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 in May 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, 2019 under the 2015 Plan range from 2025 to 2026.

Our stockholders approved the 2010 Directors Stock Plan (the “2010 Directors Plan”) in May 2010, under which 0.5 million shares of common stock have been reserved for issuance. This plan replaced 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 become vested in full on the first anniversary of the grant date. Options issued under the 2010 Directors Plan had a ten-year contractual term. All remaining options under the 2010 Directors Plan expired 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, 2019, 2018 and 2017, which was recognized as follows:

<i>(In thousands)</i>	2019	2018	2017
Stock-based compensation expense included in cost of sales	\$ 369	\$ 418	\$ 379
Selling, general and administrative expense	3,889	3,989	4,063
Research and development expense	2,704	2,748	2,991
Stock-based compensation expense included in operating expenses	6,593	6,737	7,054
Total stock-based compensation expense	6,962	7,155	7,433
Tax benefit for expense associated with non-qualified options, PSUs, RSUs and restricted stock	(1,659)	(1,432)	(1,699)
Total stock-based compensation expense, net of tax	\$ 5,303	\$ 5,723	\$ 5,734

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 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. 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 vest and are 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 contained performance conditions and would have vested at the end of a three-year period if such performance conditions were met. The fair value of these performance-based PSU awards was equal to the closing price of our stock on the date of grant. These awards were forfeited during the first quarter of 2020 as the performance conditions were not achieved.

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, 2018 and 2019 and the changes that occurred during 2019:

<i>(In thousands, except per share amounts)</i>	Number of shares	Weighted Average Grant Date Fair Value
Unvested PSUs, RSUs and restricted stock outstanding, December 31, 2018	1,570	\$ 18.52
PSUs, RSUs and restricted stock granted	897	\$ 9.63
PSUs, RSUs and restricted stock vested	(368)	\$ 17.23
PSUs, RSUs and restricted stock forfeited	(208)	\$ 18.24
Unvested PSUs, RSUs and restricted stock outstanding, December 31, 2019	1,891	\$ 14.58

As of December 31, 2019, total unrecognized compensation expense related to the non-vested portion of market-based PSUs, RSUs and restricted stock was approximately \$17.2 million, which is expected to be recognized over an average remaining recognition period of 2.9 years and adjusted for actual forfeitures as they occur.

The following table details the significant assumptions that impact the fair value estimate of the market-based PSUs:

	2019	2018	2017
Estimated fair value per share	\$9.53 to \$18.05	\$ 16.59	\$ 24.17
Expected volatility	32.7% to 38.9%	27.98% to 31.58%	27.03%
Risk-free interest rate	1.6% to 2.46%	2.11% to 2.99%	1.78%
Expected dividend yield	2.3% to 4.09%	1.83% to 2.49%	1.74%

As of December 31, 2019, 1.0 million shares were available for issuance under shareholder-approved equity plans in connection with the grant and exercise of stock options, PSU's, RSU's or restricted stock.

Stock Options

The following table is a summary of our stock options outstanding as of December 31, 2019 and 2018 and the changes that occurred during 2019:

	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, 2018	4,382	\$ 22.91	4.10	\$ —
Stock options granted	—	\$ —		
Stock options exercised	(34)	\$ 15.53		
Stock options forfeited	(32)	\$ 15.56		
Stock options expired	(744)	\$ 23.72		
Stock options outstanding, December 31, 2019	3,572	\$ 22.88	3.40	\$ —
Stock options exercisable, December 31, 2019	3,570	\$ 22.89	3.40	\$ —

All of the options above were issued at exercise prices that approximated fair market value at the date of grant. As of December 31, 2019, total unrecognized compensation expense related to non-vested stock options was approximately \$11 thousand, which is expected to be recognized over an average remaining recognition period of one year and will be adjusted for actual forfeitures as they occur.

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 2019 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, 2019. The amount of aggregate intrinsic value will change based on the fair market value of ADTRAN's stock and was \$0 as of December 31, 2019.

The total pre-tax intrinsic value of options exercised during 2019, 2018 and 2017 was \$0.1 million, \$0.2 million and \$3.4 million, respectively. The fair value of options fully vesting during 2019, 2018 and 2017 was \$0.9 million, \$2.5 million and \$4.3 million, respectively.

The following table further describes our stock options outstanding as of December 31, 2019:

Range of Exercise Prices	Options Outstanding			Options Exercisable		
	Options Outstanding at December 31, 2019 (In thousands)	Weighted Avg. Remaining Contractual Life in Years	Weighted Average Exercise Price	Options Exercisable at December 31, 2019 (In thousands)	Weighted Average Exercise Price	
\$14.88 – \$18.96	1,135	4.90	\$ 15.89	1,133	\$ 15.89	
\$18.97 – \$23.45	685	4.70	\$ 19.10	685	\$ 19.10	
\$23.46 – \$30.35	686	3.67	\$ 24.17	686	\$ 24.17	
\$30.36 – \$41.92	1,066	1.29	\$ 31.93	1,066	\$ 31.93	
	3,572			3,570		

The Black-Scholes option pricing model (the "Black-Scholes Model") is used to determine 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 during the years ended December 31, 2019, 2018 or 2017.

Note 5 – Investments

Debt Securities and Other Investments

As of December 31, 2019, we held the following debt securities and other investments, recorded at fair value:

(In thousands)	Amortized Cost	Gross Unrealized		Fair Value
		Gains	Losses	
Corporate bonds	\$ 9,304	\$ 80	\$ —	\$ 9,384
Municipal fixed-rate bonds	930	—	—	930
Asset-backed bonds	6,867	26	(3)	6,890
Mortgage/Agency-backed bonds	6,944	26	(8)	6,962
U.S. government bonds	12,311	21	(9)	12,323
Foreign government bonds	372	—	(1)	371
Variable rate demand notes	800	—	—	800
Available-for-sale debt securities held at fair value	\$ 37,528	\$ 153	\$ (21)	\$ 37,660

As of December 31, 2018, we held the following debt securities and other investments, recorded at fair value:

(In thousands)	Amortized Cost	Gross Unrealized		Fair Value
		Gains	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

As of December 31, 2019, our debt securities had the following contractual maturities:

(In thousands)	Corporate bonds	Municipal fixed-rate bonds	Asset-backed bonds	Mortgage / Agency-backed bonds	U.S. government bonds	Foreign government bonds
Less than one year	\$ 4,005	\$ —	\$ 396	\$ —	\$ —	\$ —
One to two years	4,120	930	760	213	1,347	—
Two to three years	967	—	1,632	1,424	9,344	—
Three to five years	292	—	2,092	494	1,632	371
Five to ten years	—	—	1,719	792	—	—
More than ten years	—	—	291	4,039	—	—
Total	\$ 9,384	\$ 930	\$ 6,890	\$ 6,962	\$ 12,323	\$ 371

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, 2019, 2018 and 2017:

(In thousands) Year Ended December 31,	2019	2018	2017
Gross realized gains on debt securities	\$ 108	\$ 57	\$ 169
Gross realized losses on debt securities	(50)	(592)	(226)
Total gain (loss) recognized, net	\$ 58	\$ (535)	\$ (57)

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 as of December 31, 2019:

	Continuous Unrealized Loss Position for Less than 12 Months		Continuous Unrealized Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
<i>(In thousands)</i>						
Corporate bonds	203	—	—	—	203	—
Municipal fixed-rate bonds	930	—	—	—	930	—
Asset-backed bonds	797	(3)	—	—	797	(3)
Mortgage/Agency-backed bonds	2,594	(6)	136	(2)	2,730	(8)
U.S. government bonds	4,070	(9)	—	—	4,070	(9)
Marketable equity securities	371	(1)	—	—	371	(1)
Total	\$ 8,965	\$ (19)	\$ 136	\$ (2)	\$ 9,101	\$ (21)

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

	Continuous Unrealized Loss Position for Less than 12 Months		Continuous Unrealized Loss Position for 12 Months or Greater		Total	
	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses	Fair Value	Unrealized Losses
<i>(In thousands)</i>						
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 decrease in unrealized losses during 2019, 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 (loss), 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.

ASU 2016-01 also provides a measurement alternative for equity investments that do not have a readily determinable fair value in which investments can be recorded at cost less impairment, if any, adjusted for observable price changes for an identical or similar investment. We elected to record our equity investment that does not have a readily determinable fair value using the measurement alternative method. As of December 31, 2018, the Company had a note receivable of approximately \$4.3 million, which was included in other receivables on the Consolidated Balance Sheets. During the three months ended March 31, 2019, this amount was repaid and reissued in the form of debt and equity. Approximately \$3.4 million was issued as an equity investment, which represented a non-cash investing activity. The carrying value of this investment under the measurement alternative was \$3.4 million as of December 31, 2019. The remaining amount, approximately \$0.9 million, was converted into a new note receivable, which is included in other receivables on the Consolidated Balance Sheets and represents a non-cash operating activity.

Realized and unrealized gains and losses for our marketable equity securities for the twelve months ended December 31, 2019 were as follows:

<i>(In thousands)</i>	2019	2018
Realized gains (losses) on equity securities sold	\$ (96)	\$ 1,306
Unrealized gains (losses) on equity securities held	11,472	(4,821)
Total gain (loss) recognized, net	\$ 11,376	\$ (3,515)

As of December 31, 2019 and 2018, gross unrealized losses related to individual investments in a continuous loss position for twelve months or longer were not material.

U.S. GAAP establishes a three-level valuation hierarchy based upon observable and unobservable inputs for fair value measurement of financial instruments:

- Level 1 – Observable outputs; values based on unadjusted quoted prices for identical assets or liabilities in an active market;
- Level 2 – Significant inputs that are observable; values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly;
- Level 3 – Significant unobservable inputs; 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.

We have categorized our cash equivalents and our investments held at fair value into this hierarchy as follows:

<i>(In thousands)</i>	Fair Value Measurements as of December 31, 2019 Using			
	Fair Value	Quoted Prices in Active Market for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash equivalents				
Money market funds	\$ 1,309	\$ 1,309	\$ —	\$ —
Available-for-sale debt securities				
Corporate bonds	9,384	—	9,384	—
Municipal fixed-rate bonds	930	—	930	—
Asset-backed bonds	6,890	—	6,890	—
Mortgage/Agency-backed bonds	6,962	—	6,962	—
U.S. government bonds	12,323	12,323	—	—
Foreign government bonds	371	—	371	—
Variable rate demand notes	800	—	800	—
Marketable equity securities				
Marketable equity securities – various industries	35,501	35,501	—	—
Equity in escrow	298	298	—	—
Deferred compensation plan assets	21,698	21,698	—	—
Other investments	2,442	2,442	—	—
Total	\$ 98,908	\$ 73,571	\$ 25,337	\$ —

	Fair Value Measurements as of December 31, 2018 Using			
	Fair Value	Quoted Prices in Active Market for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<i>(In thousands)</i>				
Cash equivalents				
Money market funds	\$ 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	—	—
Total	\$ 87,625	\$ 56,032	\$ 31,593	\$ —

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.

Our variable rate demand notes have a structure that implies a standard expected market price. The frequent interest rate resets make it reasonable to expect the price to stay at par. These securities are priced at the expected market price.

Note 6 – Derivative Instruments and Hedging Activities

As of December 31, 2019 and 2018, we had no foreign exchange forward contracts.

The change in the fair values of our derivative instruments recorded in the Consolidated Statements of Income (Loss) during the years ended December 31, 2019, 2018 and 2017 were as follows:

<i>(In thousands)</i>	Income Statement Location	2019	2018	2017
Derivatives Not Designated as Hedging Instruments:				
Foreign exchange contracts	Other income (expense)	\$ —	\$ 13	\$ (754)

The change in our derivatives designated as hedging instruments recorded in other comprehensive income and reclassified to income, net of tax, during the twelve months ended December 31, 2019, 2018 and 2017 were as follows:

<i>(In thousands)</i>	Location of Losses Reclassified from AOCI into Income	2019	2018	2017
Derivatives Designated as Hedging Instruments:				
Foreign exchange contracts	Cost of Sales	\$ —	\$ —	\$ (897)

Note 7 – Inventory

As of December 31, 2019 and 2018, inventory was comprised of the following:

<i>(In thousands)</i>	2019	2018
Raw materials	\$ 36,987	\$ 45,333
Work in process	1,085	1,638
Finished goods	60,233	52,877
Total Inventory, net	\$ 98,305	\$ 99,848

Inventory reserves are established for estimated excess and obsolete inventory equal to the difference between the cost of the inventory and the estimated net realizable value of the inventory based on estimated reserve percentages, which consider historical usage, known trends, inventory age and market conditions. As of December 31, 2019 and 2018, our inventory reserve was \$34.1 million and \$30.0 million, respectively.

Note 8 – Property, Plant and Equipment

As of December 31, 2019 and 2018, property, plant and equipment was comprised of the following:

<i>(In thousands)</i>	2019	2018
Land	\$ 4,575	\$ 4,575
Building and land improvements	34,797	34,379
Building	68,157	68,183
Furniture and fixtures	19,959	19,831
Computer hardware and software	74,399	92,071
Engineering and other equipment	130,430	127,060
Total Property, Plant and Equipment	332,317	346,099
Less accumulated depreciation	(258,609)	(265,464)
Total Property, Plant and Equipment, net	\$ 73,708	\$ 80,635

Depreciation expense was \$12.5 million, \$12.7 million and \$12.8 million for the years ended December 31, 2019, 2018 and 2017, respectively, which is recorded in cost of sales, selling, general and administrative expense and research and development expense in the consolidated statements of income.

We assess long-lived assets used in operations for potential 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. During the year ended December 31, 2019, the Company recognized impairment charges of \$3.9 million related to the abandonment of certain information technology projects in which we had previously capitalized expenses related to these projects. The impairment charges were determined based on actual costs incurred as part of the projects. No impairment charges were recognized during the years ended December 31, 2018 and 2017.

Note 9 – Leases

We have operating leases for office space, automobiles and various other equipment in the U.S. and in certain international locations. We also reviewed other contracts, such as manufacturing agreements and service agreements, for potential embedded leases. We specifically reviewed these other contracts to determine whether we have the right to substantially all of the economic benefit from the use of any specified assets or the right to direct the use of any specified assets, either of which would indicate the existence of a lease.

As of December 31, 2019, our operating leases had remaining lease terms of one month to six years, some of which included options to extend the leases for up to nine years, and some of which included options to terminate the leases within three months. For those leases that are reasonably assured to be renewed, we have included the option to extend as part of our right of use asset and lease liability. Leases with an initial term of 12 months or less were not recorded on the balance sheet and lease expense for these leases is recognized on a straight-line basis over the lease term. Lease expense related to these short-term leases was \$0.4 million for the twelve months ended December 31, 2019, and is included in cost of sales, selling, general and administrative expenses and research and development expenses in the Consolidated Statements of Income. Lease expense related to variable lease payments that do not depend on an index or rate, such as real estate taxes and insurance reimbursements, was \$0.9 million for the twelve months ended December 31, 2019. For lease agreements entered into or reassessed after the adoption of Topic 842, we elected to not separate lease and nonlease components. Our lease agreements do not contain any material residual value guarantees or material restrictive covenants.

Supplemental balance sheet information related to operating leases is as follows:

<i>(In thousands)</i>	Classification	December 31, 2019	January 1, 2019 ⁽¹⁾
Assets			
Right of use lease assets	Other assets	\$ 8,452	\$ 10,322
Total lease asset		\$ 8,452	\$ 10,322
Liabilities			
Current lease liability	Accrued expenses	\$ 2,676	\$ 2,948
Non-current lease liability	Other non-current liabilities	5,818	7,374
Total lease liability		\$ 8,494	\$ 10,322

(1) Reflects the adoption of the new lease accounting standard on January 1, 2019.

The components of lease expense included in the Consolidated Statements of Income for the twelve months ended December 31, 2019 were as follows:

<i>(In thousands)</i>	For the Year Ended December 31, 2019
Research and development expenses	\$ 2,417
Selling, general and administrative expenses	1,400
Cost of sales	64
Total operating lease expense	\$ 3,881

As of December 31, 2019, operating lease liabilities included on the Consolidated Balance Sheet by future maturity were as follows:

<i>(In thousands)</i>	Amount
2020	\$ 2,856
2021	2,412
2022	1,705
2023	1,160
2024	482
Thereafter	264
Total lease payments	8,879
Less: Interest	(385)
Present value of lease liabilities	\$ 8,494

Future operating lease payments include \$0.7 million related to options to extend lease terms that are reasonably certain of being exercised. There are no legally binding leases that have not yet commenced.

As of December 31, 2018, future minimum rental payments under non-cancelable operating leases, including renewals determined to be reasonably assured as of December 31, 2018, with original maturities of greater than 12 months, were as follows:

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

(1) Certain renewal options were subsequently determined to not be reasonably assured of renewal upon the Company's adoption of the new lease accounting standard on January 1, 2019.

Our leases do not provide an implicit rate and therefore we use an incremental borrowing rate based on the information available at commencement date in determining the present value of lease payments. We used the incremental borrowing rate on January 1, 2019, for operating leases that commenced on or prior to that date. The incremental borrowing rate was determined on a portfolio basis by grouping leases with similar terms as well as grouping leases based on a U.S. dollar or Euro functional currency. The actual rate was then determined based on a credit spread over LIBOR as well as the Bloomberg Curve Matrix for the U.S. Communications section. The following table provides information about our weighted average lease terms and weighted average discount rates as of December 31, 2019:

	As of December 31, 2019
Weighted average remaining lease term (years)	
Operating leases with USD functional currency	2.6
Operating leases with Euro functional currency	4.4
Weighted average discount rate	
Operating leases with USD functional currency	4.02%
Operating leases with Euro functional currency	1.84%

Supplemental cash flow information related to operating leases is as follows:

<i>(In thousands)</i>	As of December 31, 2019	
Cash paid for amounts included in the measurement of operating lease assets / liabilities		
Cash used in operating activities related to operating leases	\$	3,439
Right-of-use assets obtained in exchange for lease obligations	\$	11,615

Sales-Type Leases

We are the lessor in sales-type lease arrangements for network equipment, which have initial terms of up to five years. Our sales-type lease arrangements contain either a provision whereby the network equipment reverts back to us upon the expiration of the lease or a provision that allows the lessee to purchase the network equipment at a bargain purchase amount at the end of the lease. In addition, our sales-type lease arrangements do not contain any residual value guarantees or material restrictive covenants. The allocation of the consideration between lease and nonlease components is determined by stand-alone selling price by component. 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. The Company has elected to exclude taxes related to sales-type leases from revenue and the associated expense of such taxes. As of December 31, 2019 and 2018, we did not have an allowance for credit losses for our net investment in sales-type leases. As of December 31, 2019 and 2018, the components of the net investment in sales-type leases were as follows:

<i>(In thousands)</i>	December 31, 2019	December 31, 2018
Current minimum lease payments receivable ⁽¹⁾	\$ 1,201	\$ 11,339
Non-current minimum lease payments receivable ⁽²⁾	889	1,670
Total minimum lease payments receivable	2,090	13,009
Less: Current unearned revenue ⁽¹⁾	365	631
Less: Non-current unearned revenue ⁽²⁾	163	473
Net investment in sales-type leases	\$ 1,562	\$ 11,905

⁽¹⁾ Included in other receivables on the Consolidated Balance Sheet.

⁽²⁾ Included in other assets on the Consolidated Balance Sheet.

The components of sales-type lease gross profit recognized at the lease commencement date and interest and dividend income, included in the Consolidated Statements of Income for the twelve months ended December 31, 2019 were as follows:

<i>(In thousands)</i>	For the Year Ended December 31, 2019
Sales - Network Solutions	\$ 1,723
Cost of sales - Network Solutions	675
Gross profit	\$ 1,048
Interest and dividend income	\$ 357

As of December 31, 2019 future minimum lease payments to be received from sales-type leases were as follows:

<i>(In thousands)</i>	Amount
2020	\$ 1,201
2021	565
2022	232
2023	86
2024	6
Total	\$ 2,090

Note 10 – Goodwill

Goodwill, all of which relates to our acquisitions of Bluesocket, Inc. in 2011 and SmartRG in 2018, was \$7.0 million as of December 31, 2019 and \$7.1 million as of December 31, 2018 of which \$6.6 million and \$0.4 million was allocated to our Network Solutions and Services & Support reportable segments, respectively, for the year ended December 31, 2019, and of which \$6.7 million and \$0.4 million was allocated to our Network Solutions and Services & Support reportable segments, respectively, for the year ended December 31, 2018. Goodwill related to our SmartRG acquisition was reduced by \$0.1 million during the twelve months ended December 31, 2019 as a result of a measurement period adjustment.

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 for the years ended December 31, 2019, 2018 and 2017, there were no events or circumstances that occurred that would more likely than not reduce the fair value of goodwill below its carrying value.

Note 11 – Intangible Assets

As of December 31, 2019 and 2018, our intangible assets were comprised of the following:

(In thousands)	2019			2018		
	Gross Value	Accumulated Amortization	Net Value	Gross Value	Accumulated Amortization	Net Value
Customer relationships	\$ 22,356	\$ (7,233)	\$ 15,123	\$ 22,455	\$ (5,380)	\$ 17,075
Developed technology	10,170	(3,379)	6,791	12,801	(4,867)	7,934
Licensed technology	5,900	(1,174)	4,726	5,900	(520)	5,380
Supplier relationships	2,800	(2,508)	292	2,800	(1,108)	1,692
Intellectual property	—	—	—	930	(930)	—
Licensing agreements	560	(79)	481	560	(5)	555
Patents	500	(226)	274	500	(157)	343
Trade names	310	(176)	134	310	(106)	204
Non-compete	—	—	—	200	(200)	—
Total	\$ 42,596	\$ (14,775)	\$ 27,821	\$ 46,456	\$ (13,273)	\$ 33,183

Amortization expense was \$5.3 million, \$2.3 million and \$2.9 million for the years ended December 31, 2019, 2018 and 2017, respectively.

As of December 31, 2019, the estimated future amortization expense of intangible assets is as follows:

(In thousands)	Amount
2020	\$ 4,444
2021	4,095
2022	3,471
2023	3,320
2024	3,226
Thereafter	9,265
Total	\$ 27,821

Note 12 – 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 (the “Taxable Revenue Bonds”) and loaned the proceeds from the sale of the Taxable Revenue Bonds to ADTRAN. Further advances on the Taxable Revenue Bonds were made by the Authority, bringing the total amount outstanding to \$50.0 million. The Taxable Revenue Bonds bore interest, payable monthly with an interest rate of 2% per annum. The Taxable Revenue Bond’s outstanding aggregate principal amount of \$24.6 million matured on January 1, 2020 and was repaid in full on January 2, 2020. The fair value of the bond as of December 31, 2019 was \$24.6 million. We are required to make payments to the Authority in amounts necessary to pay the interest on the Taxable Revenue Bonds. Included in short-term investments as of December 31, 2019 is \$25.6 million which is invested in a 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 Taxable Revenue Bonds with the collateral deposit in order to reduce the balance of the indebtedness.

In conjunction with this program, we were eligible to receive certain economic incentives from the state of Alabama that reduce the amount of payroll withholdings that we were required to remit to the state for those employment positions that qualify under the program. We realized economic incentives related to payroll withholdings totaling \$1.2 million, \$1.4 million and \$1.5 million for the years ended December 31, 2019, 2018 and 2017, respectively. This program concluded on January 2, 2020 following the maturity of the Taxable Revenue Bonds. No additional benefits will be received in future periods.

We made principal payments of \$1.0 million and \$1.1 million for the years ended December 31, 2019 and 2018. No additional principal payments will be made in future periods.

Note 13 – Income Taxes

A summary of the components of the expense (benefit) for income taxes for the years ended December 31, 2019, 2018 and 2017 is as follows:

<i>(In thousands)</i>	2019	2018	2017
Current			
Federal	\$ (518)	\$ (8,001)	\$ 466
State	(1,065)	(476)	(150)
International	(282)	11,705	6,458
Total Current	(1,865)	3,228	6,774
Deferred			
Federal	24,801	(14,448)	8,024
State	5,815	(3,390)	1,882
International	(546)	581	4,167
Total Deferred	30,070	(17,257)	14,073
Total Income Tax Expense (Benefit)	\$ 28,205	\$ (14,029)	\$ 20,847

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

	2019	2018	2017
Tax provision computed at the federal statutory rate	21.00%	21.00%	35.00%
State income tax provision, net of federal benefit	6.97	14.53	2.17
Federal research credits	15.53	14.23	(11.88)
Foreign taxes	2.83	(11.45)	(2.27)
Tax-exempt income	0.49	0.45	(0.75)
State tax incentives	3.85	3.15	(2.71)
Change in valuation allowance	(172.82)	—	—
Foreign tax credits	16.69	—	—
Stock-based compensation	(6.01)	(2.87)	1.43
Domestic production activity deduction	—	—	(1.13)
Bargain purchase	—	8.82	—
Impact of U.S. tax reform	—	12.00	26.70
Global intangible low-taxed income ("GILTI")	(1.87)	(17.48)	—
Other, net	(0.49)	(0.34)	0.09
Effective Tax Rate	(113.83)%	42.04%	46.65%

Income (loss) before expense (benefit) for income taxes for the years ended December 31, 2019, 2018 and 2017 is as follows:

<i>(In thousands)</i>	2019	2018	2017
U.S. entities	\$ (29,829)	\$ (74,131)	\$ 26,552
International entities	5,052	40,760	18,135
Total	\$ (24,777)	\$ (33,371)	\$ 44,687

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

Deferred income taxes on the Consolidated Balance Sheets 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 were as follows:

<i>(In thousands)</i>	2019	2018
Deferred tax assets		
Inventory	\$ 7,144	\$ 6,609
Accrued expenses	2,330	2,850
Investments	—	1,122
Deferred compensation	5,660	4,779
Stock-based compensation	2,451	3,069
Uncertain tax positions related to state taxes and related interest	241	326
Pensions	7,074	5,538
Foreign losses	2,925	3,097
State losses and credit carry-forwards	3,995	8,164
Federal loss and research carry-forwards	12,171	17,495
Lease liabilities	2,496	—
Capitalized research and development expenditures	22,230	—
Valuation allowance	(48,616)	(5,816)
Total Deferred Tax Assets	20,101	47,233
Deferred tax liabilities		
Property, plant and equipment	(2,815)	(3,515)
Intellectual property	(5,337)	(6,531)
Right of use lease assets	(2,496)	—
Investments	(1,892)	—
Total Deferred Tax Liabilities	(12,540)	(10,046)
Net Deferred Tax Assets	\$ 7,561	\$ 37,187

In December 2017, the Tax Cuts and Jobs Act ("the Act") was signed into law. As a result of the Act, 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. We calculated our best estimate of the impact of the Act in our 2017 year-end income tax provision in accordance with Staff Accounting Bulletin No. 118, which was issued to address the application of U.S. GAAP in situations when a registrant does not have the necessary information available, prepared or analyzed to finalize the accounting for certain income tax effects of the Act. Additional work to complete a more detailed analysis of historical foreign earnings, as well as the full impact relating 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 for the year ended December 31, 2018.

As of December 31, 2019 and 2018, 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, which resulted in a deferred tax benefit of \$0.4 million and \$2.8 million in 2019 and 2018, respectively, was recorded as an adjustment to other comprehensive income (loss), presented in the Consolidated Statements of Comprehensive Income (Loss).

The Company continually reviews the adequacy of our 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 realized in accordance with ASC 740, *Income Taxes*. Due to our recent decrease in revenue and profitability for 2019, and all other positive and negative objective evidence considered as part of our analysis, our ability to consider other subjective evidence such as projections for future growth is limited when evaluating whether our deferred tax assets will be realized. As such, the Company was no longer able to conclude that it was more likely than not that our domestic deferred tax assets would be realized and a valuation allowance against our domestic deferred tax assets was established in the third quarter of 2019. The amount of the deferred tax assets considered realizable may be adjusted in future periods in the event that sufficient evidence is present to support a conclusion that it is more likely than not that all or a portion of our domestic deferred tax assets will be realized.

As of December 31, 2019, the Company had gross deferred tax assets totaling \$56.2 million offset by a valuation allowance totaling \$48.6 million. Of the valuation allowance, \$42.8 million was established in the current year primarily related to our domestic deferred tax assets. The remaining \$5.8 million established in prior periods related to state research and development credit carryforwards and foreign net operating loss and research and development credit carryforwards where we lack sufficient activity to realize those deferred tax assets. The remaining \$7.6 million in deferred tax assets that were not offset by a valuation allowance are located in various foreign jurisdictions where the Company believes it is more likely than not we will realize these deferred tax assets.

Supplemental balance sheet information related to deferred tax assets is as follows:

(In thousands)	December 31, 2019		
	Deferred Tax Assets	Valuation Allowance	Deferred Tax Assets, net
Domestic	\$ 46,266	\$ (46,266)	\$ —
International	9,911	(2,350)	7,561
Total	\$ 56,177	\$ (48,616)	\$ 7,561

As of December 31, 2019 and 2018, the deferred tax assets for foreign and domestic loss carry-forwards, research and development tax credits, unamortized research and development costs and state credit carry-forwards totaled \$41.3 million and \$28.8 million, respectively. As of December 31, 2019, \$19.1 million of these deferred tax assets will expire at various times between 2020 and 2039. The remaining deferred tax assets will either amortize through 2029 or carryforward indefinitely.

As of December 31, 2019 and 2018, respectively, our cash and cash equivalents were \$73.8 million and \$105.5 million and short-term investments were \$33.2 million and \$3.2 million, which provided available short-term liquidity of \$107.0 million and \$108.7 million. Of these amounts, our foreign subsidiaries held cash of \$52.3 million and \$87.1 million, respectively, representing approximately 48.9% and 80.1% 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 of 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 2019, 2018 and 2017, no income tax benefit or expense was recorded for stock options exercised as an adjustment to equity.

The change in the unrecognized income tax benefits for the years ended December 31, 2019, 2018 and 2017 is reconciled below:

(In thousands)	2019	2018	2017
Balance at beginning of period	\$ 1,868	\$ 2,366	\$ 2,226
Increases for tax position related to:			
Prior years	—	3	465
Current year	161	254	285
Decreases for tax positions related to:			
Prior years	(71)	—	(14)
Expiration of applicable statute of limitations	(471)	(755)	(596)
Balance at end of period	\$ 1,487	\$ 1,868	\$ 2,366

As of December 31, 2019, 2018 and 2017, our total liability for unrecognized tax benefits was \$1.5 million, \$1.9 million and \$2.4 million, respectively, of which \$1.4 million, \$1.7 million and \$2.2 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, 2019, 2018 and 2017, the balances of accrued interest and penalties were \$0.5 million, \$0.7 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. for 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 2016.

Note 14 – 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 as of December 31, 2019 and 2018, were as follows:

<i>(In thousands)</i>	2019	2018
Change in projected benefit obligation:		
Projected benefit obligation at beginning of period	\$ 37,245	\$ 34,893
Service cost	1,471	1,193
Interest cost	634	727
Actuarial loss - experience	453	38
Actuarial loss - assumptions	5,091	2,139
Benefit payments	(166)	(138)
Effects of foreign currency exchange rate changes	(826)	(1,607)
Projected benefit obligation at end of period	43,902	37,245
Change in plan assets:		
Fair value of plan assets at beginning of period	24,159	26,624
Actual gain (loss) on plan assets	4,392	(2,024)
Contributions	—	688
Effects of foreign currency exchange rate changes	(535)	(1,129)
Fair value of plan assets at end of period	28,016	24,159
Unfunded status at end of period	\$ (15,886)	\$ (13,086)

The accumulated benefit obligation was \$43.9 million and \$37.2 million as of December 31, 2019 and 2018, respectively. The increase in the accumulated benefit obligation and the actuarial loss was primarily attributable to a decrease in the discount rate during 2019.

The net amounts recognized in the balance sheet for the unfunded pension liability as of December 31, 2019 and 2018 were as follows:

<i>(In thousands)</i>	2019	2018
Current liability	\$ —	\$ —
Pension liability	15,886	13,086
Total	\$ 15,886	\$ 13,086

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, 2019, 2018 and 2017 were as follows:

<i>(In thousands)</i>	2019	2018	2017
Net periodic benefit cost:			
Service cost	\$ 1,471	\$ 1,193	\$ 1,260
Interest cost	634	727	607
Expected return on plan assets	(1,392)	(1,548)	(1,267)
Amortization of actuarial losses	795	247	309
Net periodic benefit cost	1,508	619	909
Other changes in plan assets and benefit obligations recognized in other comprehensive income:			
Net actuarial (gain) loss	2,488	5,638	(654)
Amortization of actuarial losses	(771)	(196)	(406)
Amount recognized in other comprehensive income (loss)	1,717	5,442	(1,060)
Total recognized in net periodic benefit cost and other comprehensive income (loss)	\$ 3,225	\$ 6,061	\$ (151)

The amounts recognized in accumulated other comprehensive income (loss) as of December 31, 2019 and 2018 were as follows:

<i>(In thousands)</i>	2019	2018
Net actuarial loss	\$ (12,973)	\$ (11,256)

The defined benefit pension plan is accounted for on an actuarial basis, which requires the use 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. 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, 2019, 2018 and 2017 were as follows:

	2019	2018	2017
Discount rate	1.75%	2.13%	1.90%
Rate of compensation increase	2.00%	2.00%	2.00%
Expected long-term rates of return	5.90%	5.90%	5.90%

The weighted-average assumptions that were used to determine the benefit obligation as of December 31, 2019 and 2018:

	2019	2018
Discount rate	1.00%	1.75%
Rate of compensation increase	2.00%	2.00%

Actuarial gains and losses are recorded in accumulated other comprehensive income (loss). 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 \$0.8 million will be amortized from accumulated other comprehensive income (loss) into net periodic pension cost in 2020 for the net actuarial loss.

We do not anticipate making any contributions to the pension plan in 2020.

The following pension benefit payments, which reflect expected future service, as appropriate, are expected to be paid to participants:

<i>(In thousands)</i>	
2020	\$ 515
2021	582
2022	619
2023	706
2024	789
Thereafter	4,872
Total	\$ 8,083

U.S. GAAP establishes a three-level valuation hierarchy based upon observable and unobservable inputs for fair value measurement of financial instruments:

- Level 1 – Observable outputs; values based on unadjusted quoted prices for identical assets or liabilities in an active market;
- Level 2 – Significant inputs that are observable; values based on quoted prices in markets that are not active or model inputs that are observable either directly or indirectly;
- Level 3 – Significant unobservable inputs; 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.

We have categorized our cash equivalents and our investments held at fair value into this hierarchy as follows:

Fair Value Measurements at December 31, 2019 Using				
	Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<i>(In thousands)</i>				
Cash and cash equivalents	\$ 691	\$ 691	\$ —	\$ —
Available-for-sale securities				
Bond funds:				
Government bonds	6,645	6,645	—	—
Corporate bonds	5,514	5,514	—	—
Emerging markets bonds	531	531	—	—
Equity funds:				
Global equity	11,071	11,071	—	—
Emerging markets	956	956	—	—
Balanced fund	863	863	—	—
Large cap value	312	312	—	—
Global real estate fund	902	902	—	—
Managed futures fund	531	531	—	—
Available-for-sale securities	27,325	27,325	—	—
Total	\$ 28,016	\$ 28,016	\$ —	\$ —

Fair Value Measurements at December 31, 2018 Using				
	Fair Value	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
<i>(In thousands)</i>				
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	\$ —	\$ —

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 (the "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 (the "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 (\$280,000 for 2019). All matching contributions under the Savings Plan vest immediately. Employer contribution expense and plan administration costs for the Savings Plan amounted to approximately \$4.4 million, \$4.4 million and \$4.6 million in 2019, 2018 and 2017, 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 PSUs and RSUs 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 as of December 31, 2019 and 2018 were as follows:

<i>(In thousands)</i>	2019	2018
Fair Value of Plan Assets		
Long-term investments	\$ 21,698	\$ 18,256
Total Fair Value of Plan Assets	\$ 21,698	\$ 18,256
Amounts Payable to Plan Participants		
Deferred compensation liability	\$ 21,698	\$ 18,256
Total Amounts Payable to Plan Participants	\$ 21,698	\$ 18,256

Interest and dividend income of the Trust are included in interest and dividend income in the accompanying 2019, 2018 and 2017 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 2019, 2018 and 2017 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 2019, 2018 and 2017 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 2019, 2018 and 2017 of \$3.6 million, \$(2.1) million and \$(2.6) million, respectively.

Retiree Medical Coverage

We provided medical, dental and prescription drug coverage to two spouses of retired former officers on the same terms as provided to our active officers for up to 30 years. As of December 31, 2019 and 2018, this liability totaled \$0.1 million.

Note 15 – Segment Information and Major Customers

Our chief operating decision maker regularly reviews our financial performance based on two reportable segments across our segments– (1) Network Solutions and (2) Services & Support. Network Solutions includes hardware and software products and next-generation virtualized solutions used in service provider or business networks, as well as prior-generation products. Services & Support includes a portfolio of maintenance, network implementation and solutions integration services, which include hosted cloud services and subscription services.

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 income tax (expense) benefit 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, 2019, 2018 and 2017. Asset information by reportable segment is not reported, since we do not produce such information internally.

<i>(In thousands)</i>	2019		2018		2017	
	Sales	Gross Profit	Sales	Gross Profit	Sales	Gross Profit
Network Solutions	\$ 455,226	\$ 191,549	\$ 458,232	\$ 179,303	\$ 540,396	\$ 260,833
Services & Support	74,835	27,618	71,045	24,262	126,504	42,802
Total	\$ 530,061	\$ 219,167	\$ 529,277	\$ 203,565	\$ 666,900	\$ 303,635

Sales by Category

In addition to the above reporting segments, we also report revenue for the following three categories – (1) Access & Aggregation, (2) Subscriber Solutions & Experience and (3) Traditional & Other Products.

The following tables disaggregates our revenue by major source for the years ended December 31, 2019, 2018 and 2017:

(In thousands)	2019		
	Network Solutions	Services & Support	Total
Access & Aggregation	\$ 289,980	\$ 58,894	\$ 348,874
Subscriber Solutions & Experience ⁽¹⁾	144,651	8,269	152,920
Traditional & Other Products	20,595	7,672	28,267
Total	\$ 455,226	\$ 74,835	\$ 530,061

(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

- (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.

Additional Information

The following table presents sales information by geographic area for the years ended December 31, 2019, 2018 and 2017:

(In thousands)	2019	2018	2017
United States	\$ 300,853	\$ 288,843	\$ 508,178
Mexico	90,795	12,186	2,246
Germany	78,062	167,251	119,502
Other international	60,351	60,997	36,974
Total	\$ 530,061	\$ 529,277	\$ 666,900

Customers comprising more than 10% of revenue can change from year to year. Single customers comprising more than 10% of our revenue in 2019 included three customers at 19%, 17% and 13%. 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%. Other than those with more than 10% of revenues disclosed above, and excluding distributors, our next five largest customers can change, and has historically changed, from year-to-year. These combined customers represented 15%, 18% and 15% of total revenue in 2019, 2018 and 2017, respectively.

As of December 31, 2019, property, plant and equipment, net totaled \$73.7 million, which included \$69.9 million held in the U.S. and \$3.9 million held outside the U.S. As of December 31, 2018, property, plant and equipment, net totaled \$80.6 million, which included \$77.3 million held in the U.S. and \$3.3 million held outside the U.S. Property, plant and equipment, net is reported on a company-wide, functional basis only.

Note 16 – Commitments and Contingencies

Securities Class Action Lawsuit

On October 17, 2019, a purported stockholder class action lawsuit, captioned *Burbridge v. ADTRAN, Inc. et al.*, Docket No. 19-cv-09619, was filed in the United States District Court for the Southern District of New York against the Company, two of its current executive officers and one of its former executive officers. The complaint alleges violations of federal securities laws and seeks unspecified compensatory damages on behalf of purported purchasers of ADTRAN securities between February 28, 2019 and October 9, 2019. The lawsuit claims that the defendants made materially false and misleading statements regarding, and/or failed to disclose material adverse facts about, the Company's business, operations and prospects, specifically relating to the Company's internal control over financial reporting, excess and obsolete inventory reserves, financial results and shipments to a Latin American customer. Investors in ADTRAN securities had until December 16, 2019 to move the court to serve as lead plaintiff in this action.

On December 16, 2019, two purported investors in ADTRAN securities filed motions seeking to be appointed lead plaintiff in the case. On January 6, 2020, the United States District Court for the Southern District of New York granted Defendants' unopposed request to transfer the case to the United States District Court for the Northern District of Alabama, where the case is now pending as *Burbridge v. ADTRAN, Inc. et al.*, Docket No. 5:20-cv-00050-LCB. On January 27, 2020, the two prospective lead plaintiff movants filed a stipulation among plaintiffs seeking to be appointed as co-lead plaintiffs in the case.

We disagree with the claims made in the complaint and intend to vigorously defend against this lawsuit. At this time, we are unable to predict the outcome of or estimate the possible loss or range of loss, if any, associated with this lawsuit.

Other Legal Matters

In addition to the litigation described above, from time to time we are subject to or otherwise involved in various lawsuits, claims, investigations and legal proceedings that arise out of or are incidental to the conduct of our business (collectively, "Legal Matters"), including those relating to employment matters, patent rights, regulatory compliance matters, stockholder claims, and contractual and other commercial disputes. Such Legal Matters, even if not meritorious, could result in the expenditure of significant financial and managerial resources. Additionally, an unfavorable outcome in a legal matter, including in a patent dispute, could require the Company to pay damages, entitle claimants to other relief, such as royalties, or could prevent the Company from selling some of its products in certain jurisdictions. While the Company cannot predict with certainty the results of the Legal Matters in which it is currently involved, the Company does not expect that the ultimate outcome of such Legal Matters will individually or in the aggregate have a material adverse effect on its business, results of operations, financial condition or cash flows.

Investment Commitment

We have committed to invest up to an aggregate of \$7.9 million in two private equity funds, of which \$7.7 million has been applied to these commitments as of December 31, 2019.

Performance Bonds

Certain contracts, customers and/or jurisdictions in which we do business require us to provide various guarantees of performance such as bid bonds, performance bonds and customs bonds. As of December 31, 2019, we had commitments related to these bonds totaling \$9.3 million which expire at various dates through August 2024. As of December 31, 2018, we had commitments related to these bonds totaling \$6.5 million. Although the triggering events vary from contract to contract, in general we would only be liable for the amount of these guarantees in the event of default in our under each contract, the probability of which we believe is remote.

Note 17 – Earnings (Loss) per Share

A summary of the calculation of basic and diluted earnings (loss) per share for the years ended December 31, 2019, 2018 and 2017 is as follows:

<i>(In thousands, except for per share amounts)</i>	2019	2018	2017
Numerator			
Net Income (Loss)	\$ (52,982)	\$ (19,342)	\$ 23,840
Denominator			
Weighted average number of shares – basic	47,836	47,880	48,153
Effect of dilutive securities:			
Stock options	—	—	406
Restricted stock and restricted stock units	—	—	140
Weighted average number of shares – diluted	<u>47,836</u>	<u>47,880</u>	<u>48,699</u>
Earnings (loss) per share – basic	\$ (1.11)	\$ (0.40)	\$ 0.50
Earnings (loss) per share – diluted	\$ (1.11)	\$ (0.40)	\$ 0.49

For each of the years ended December 31, 2019 and 2018, 5.7 million and 2.5 million, respectively, shares of unvested stock options, PSUs, RSUs and restricted stock were excluded from the calculation of diluted EPS due to their anti-dilutive effect.

For the year ended December 31, 2017, 3.2 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.

Note 18 – Restructuring

During the second half of 2019, the Company implemented a restructuring plan to realign its expense structure with the reduction in revenue experienced in recent years and overall Company objectives. Management assessed the efficiency of our operations and consolidated locations and personnel, among other things, where possible. As part of this restructuring plan, the Company announced plans to reduce its overall operating expenses, both in the U.S and internationally.

In February 2019, the Company announced the restructuring of certain of our workforce predominantly in Germany, which included the closure of our office location in Munich, Germany accompanied by relocation or severance benefits for the affected employees. We also offered voluntary early retirement to certain other employees, which was announced in March 2019.

In January 2018, the Company announced an early retirement incentive program for employees that met certain defined requirements. The cumulative amount incurred during the year ended December 31, 2018 related to this restructuring program was \$7.3 million. We did not incur any additional expenses related to this restructuring program during the year ended December 31, 2019.

A reconciliation of the beginning and ending restructuring liability, which is included in accrued wages and benefits in the Consolidated Balance Sheets as of December 31, 2019 and 2018, is as follows:

<i>(In thousands)</i>	2019	2018
Balance at beginning of period	\$ 185	\$ 205
Plus: Amounts charged to cost and expense	6,014	7,261
Less: Amounts paid	(4,631)	(7,281)
Balance at end of period	\$ 1,568	\$ 185

The components of restructuring expense in the Consolidated Statements of Income are for the years ended December 31, 2019, 2018 and 2017:

<i>(In thousands)</i>	2019	2018	2017
Selling, general and administrative expenses	\$ 2,360	\$ 2,655	\$ 152
Research and development expenses	2,869	1,831	122
Cost of sales	785	2,775	—
Total restructuring expenses	\$ 6,014	\$ 7,261	\$ 274

The following table represents the components of restructuring expense by geographic area for the years ended December 31, 2019, 2018 and 2017:

<i>(In thousands)</i>	2019		2018		2017	
United States	\$	3,336	\$	7,120	\$	274
International		2,678		141		—
Total restructuring expenses	\$	6,014	\$	7,261	\$	274

Note 19 – 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

<i>(In thousands, except for per share amounts)</i>	Three Months Ended			
	March 31, 2019	June 30, 2019	September 30, 2019	December 31, 2019
Net sales	\$ 143,791	\$ 156,391	\$ 114,092	\$ 115,787
Gross profit	\$ 60,612	\$ 65,015	\$ 46,331	\$ 47,209
Operating income (loss)	\$ (6,167)	\$ 562	\$ (20,288)	\$ (14,070)
Net income (loss)	\$ 770	\$ 3,995	\$ (46,123)	\$ (11,624)
Earnings (loss) per common share - basic	\$ 0.02	\$ 0.08	\$ (0.96)	\$ (0.25)
Earnings (loss) per common share - diluted	\$ 0.02 (1)	\$ 0.08 (1)	\$ (0.96)	\$ (0.25)

<i>(In thousands, except for per share amounts)</i>	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 (1)	\$ (0.18)

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

Note 20 – Subsequent Events

On January 2, 2020, we paid off the outstanding balance of \$24.6 million of the Taxable Revenue Bonds upon their maturity. We used a restricted certificate of deposit which was held as collateral to repay the outstanding balance.

On February 5, 2020, 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 20, 2020. The quarterly dividend will be paid on March 5, 2019 payment in the aggregate amount of approximately \$4.3 million. 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.

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures.

We maintain disclosure controls and procedures that are designed to provide reasonable assurance that the information required to be disclosed by us in reports that we file or submit under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), is recorded, processed, summarized and reported within the time periods specified in the rules and forms promulgated by the SEC, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and our Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure. Because of the inherent limitations to the effectiveness of any system of disclosure controls and procedures, no evaluation of disclosure controls and procedures can provide absolute assurance that all control issues, if any, with a company have been prevented or detected on a timely basis. Even disclosure controls and procedures determined to be effective can only provide reasonable assurance that their objectives are achieved.

As of the end of the period covered by this report, an evaluation was carried out by management, including our Chief Executive Officer and our Chief Financial Officer, of the effectiveness of our disclosure controls and procedures (as defined in Exchange Act Rule 13a-15(e)) pursuant to Rule 13a-15 of the Exchange Act. Based on that evaluation, our Chief Executive Officer and our Chief Financial Officer concluded that, due to the material weakness in our internal control over financial reporting described below in Management’s Report on Internal Control over Financial Reporting, our disclosure controls and procedures were not effective as of December 31, 2019.

Despite the existence of the material weakness described below, we believe that the consolidated financial statements included in this report present fairly, in all material respects, our financial position, results of operations and cash flows for the periods presented, in conformity with accounting principles generally accepted in the United States of America.

Internal Control over Financial Reporting.

Section 404 of the Sarbanes-Oxley Act of 2002 requires management to include in our 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 our 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 Part II, Item 8, “Financial Statements and Supplementary Data,” of this Annual Report on Form 10-K.

Management’s Report on Internal Control over Financials 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, 2019. 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)*.

A material weakness is a significant deficiency, or combination of significant deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the Company's annual or interim financial statements will not be prevented or detected on a timely basis. In its assessment of the effectiveness of internal control over financial reporting as of December 31, 2019, management determined that there was a deficiency in ADTRAN's internal control over financial reporting that constituted a material weakness. Specifically, management determined that the Company did not design and maintain effective internal control over the valuation of inventory:

- Management determined that controls were not effectively designed and maintained over the determination of the estimated reserve for excess and obsolete inventory including the review of significant inputs and assumptions used to determine our excess and obsolete inventory reserve, and to ensure the completeness and accuracy of key reports and related data used in the calculation of this reserve.

This material weakness did not result in any material misstatements of the Company's financial statements or disclosures for any period presented in the accompanying consolidated financial statements. While the above material weakness did not result in a material misstatement of the Company's consolidated financial statements, the material weakness could result in a misstatement of the Company's interim or annual consolidated financial statements and disclosures that would result in a material misstatement that would not be prevented or detected. As a result, management has concluded that the Company did not maintain effective internal control over financial reporting as of December 31, 2019 based on the criteria in *Internal Control-Integrated Framework (2013)* issued by COSO.

Remediation of Previously Identified Material Weakness and Continuing Material Weakness.

The Company has redesigned, enhanced and added controls and procedures to ensure the completeness of our cycle count program and the completeness and accuracy of key reports and related data used to monitor the results of this cycle count program. Key reports and report writing tools have been integrated into our enterprise management system under IT governance to ensure completeness and accuracy of the information. We reconciled all locations under the cycle count program to ensure existence of locations. We performed a full physical inventory count of our raw material warehouse. We verified that all locations were counted at the appropriate frequency to ensure the physical existence of the inventory for accuracy of financial reporting. As a result of these remediation efforts, management has determined that, as of December 31, 2019, our controls related to our cycle count program were effectively designed, documented and maintained, and the material weakness related to these controls no longer existed.

Additionally, the Company has been working to redesign and implement enhanced controls and procedures related to the review of significant inputs and assumptions used to determine our excess and obsolete inventory reserve, and to ensure the completeness and accuracy of key reports and related data used in the calculation of the excess and obsolete inventory reserve. Key reports and calculations have been redesigned and fully integrated into our enterprise resource planning system to ensure completeness and the accuracy of significant inputs. New controls and procedures have also been established by the Company around the consideration of historical usage, known trends, market conditions, and estimated net realizable value of the inventory. The implementation of these measures is ongoing, and, while we believe that they will ultimately be effective in remediating the material weakness, management has concluded that, as of December 31, 2019, our controls related to our excess and obsolete inventory reserve were not effectively designed and maintained, and the material weakness related to these controls continued to exist.

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 under Part II, Item 8, "Financial Statements and Supplementary Data," of this Annual Report on Form 10-K.

Changes in Internal Control over Financial Reporting.

Except as noted in the preceding paragraphs, there were no changes in our internal control over financial reporting that occurred during the fiscal quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

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.

Certain information required by this Item regarding ADTRAN's executive officers is included in Part I of this Annual Report on Form 10-K under the caption "Information about our Executive Officers" in accordance with the Instructions to Item 401 of Regulation S-K.

Other information required by this Item is incorporated by reference pursuant to General Instruction G(3) of Form 10-K from ADTRAN's definitive Proxy Statement for the 2020 Annual Meeting of Stockholders (the "2020 Proxy Statement") to be filed with the SEC pursuant to Regulation 14A.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this Item is incorporated by reference pursuant to General Instruction G(3) of Form 10-K from the 2020 Proxy Statement to be filed with the SEC pursuant to Regulation 14A.

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

The information required by this Item is incorporated by reference pursuant to General Instruction G(3) of Form 10-K from the 2020 Proxy Statement to be filed with the Securities and Exchange Commission pursuant to Regulation 14A.

Securities Authorized for Issuance Under Equity Compensation Plans

Information regarding securities authorized for issuance under our equity compensation plans is incorporated by reference pursuant to General Instruction G(3) of Form 10-K from the 2020 Proxy Statement to be filed with the SEC pursuant to Regulation 14A.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS AND DIRECTOR INDEPENDENCE

The information required by this Item is incorporated by reference pursuant to General Instruction G(3) of Form 10-K from the 2020 Proxy Statement to be filed with the SEC pursuant to Regulation 14A.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this Item is incorporated by reference pursuant to General Instruction G(3) of Form 10-K from the 2020 Proxy Statement to be filed with the SEC pursuant to Regulation 14A.

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, 2019 and 2018

Consolidated Statements of Income for the years ended December 31, 2019, 2018 and 2017

Consolidated Statements of Comprehensive Income for the years ended December 31, 2019, 2018 and 2017

Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2019, 2018 and 2017

Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017

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	Asset Sale and Purchase Agreement dated 11 December 2011 Regarding the Sale and Purchase of the NSN DSLAM, GPON and ACL Products and the Related Services Businesses (Exhibit 2.1 to ADTRAN's 2011 Form 10-K/A filed July 26, 2012).
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	Bylaws, as amended (Exhibit 3.1 to ADTRAN's Form 8-K filed October 13, 2011).
4.1	Description of Securities.
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).

- (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 Compensatory Plans:

- (a) [ADTRAN, Inc. Variable Incentive Compensation Plan \(Exhibit 10.1 to ADTRAN's Form 8-K filed May 9, 2011\).](#)
- (b)* [Form of Notice Letter under the ADTRAN, Inc. Variable Incentive Compensation Plan.](#)
- (c) [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\).](#)
- (d) [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\).](#)
- (e) [Form of Nonqualified Stock Option Agreement under the 2006 Employee Stock Incentive Plan \(Exhibit 10.1 to ADTRAN's Form 8-K filed June 8, 2006\).](#)
- (f) [Form of Incentive Stock Option Agreement under the 2006 Employee Stock Incentive Plan \(Exhibit 10.2 to ADTRAN's Form 8-K filed June 8, 2006\).](#)
- (g) [ADTRAN, Inc. 2005 Directors Stock Option Plan and Forms of Nonqualified Stock Option Agreements \(Exhibit 10.1 to ADTRAN's Form 8-K filed on May 20, 2005\).](#)
- (h) [Summary of Non-Employee Director Compensation \(Exhibit 10.3\(k\) to ADTRAN's 2006 Form 10-K filed on February 28, 2007\).](#)
- (i) [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\).](#)
- (j) [ADTRAN, Inc. 2010 Directors Stock Plan \(Exhibit 4.3 to ADTRAN's Form S-8 filed on July 30, 2010\).](#)
- (k)* [Form of Stock Option Award Agreement under the ADTRAN, Inc. 2010 Directors Stock Plan.](#)
- (l)* [Form of Restricted Stock Award Agreement under the ADTRAN, Inc. 2010 Directors Stock Plan.](#)
- (m) [ADTRAN, Inc. 2015 Employee Stock Incentive Plan \(Exhibit 10.1 to ADTRAN's Form 8-K filed May 15, 2015\).](#)
- (n) [Form of Performance Shares Agreement under the ADTRAN, Inc. 2015 Employee Stock Incentive Plan \(Exhibit 4.5 to ADTRAN's Form S-8 filed December 21, 2016\).](#)
- (o) [Form of Restricted Stock Unit Agreement under the ADTRAN, Inc. 2015 Employee Stock Incentive Plan \(Exhibit 10.1 to ADTRAN's Form 8-K filed November 16, 2016\).](#)
- (p)* [Form of Option Award Agreement under the ADTRAN, Inc. 2015 Employee Stock Incentive Plan.](#)
- (q) [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\).](#)

**Exhibit
Number****Description**

	(r)	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).
	(s)	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).
	(t)	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).
	(u)	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).
	(v)	Separation Agreement and General Release, entered into July 17, 2019, between Roger Shannon and ADTRAN, Inc. (Exhibit 10 to ADTRAN's Form 10-Q filed September 20, 2019).
	(w)*	Service Agreement, entered into effective June 25, 2019, between Eduard Scheiterer and ADTRAN GmbH.
	(x)*	Form of Clawback Agreement, entered into between ADTRAN, Inc. and each executive officer of ADTRAN, Inc.
	(y)*	Employment Offer Letter, dated September 25, 2018, between Raymond Harris and ADTRAN, Inc.
	(z)*	Employment Offer Letter, dated November 29, 2018, between Jeffery F. McInnis and ADTRAN, Inc.
	(aa)*	Employment Offer Letter, dated November 26, 2018, between Ronald D. Centis and ADTRAN, Inc.
	(ab)*	Employment Offer Letter, dated August 30, 2019, between Daniel T. Whalen and ADTRAN, Inc.
21*		Subsidiaries of ADTRAN.
23*		Consent of PricewaterhouseCoopers LLP.
24*		Powers of Attorney.
31*		Rule 13a-14(a)/15d-14(a) Certifications.
32*		Section 1350 Certifications.
101		The following financial statements from the Company's Annual Report on Form 10-K for the year ended December 31, 2019, formatted in inline eXtensible Business Reporting Language (iXBRL): (i) Consolidated Balance Sheets, (ii) Consolidated Statements of Income, (iii) Consolidated Statements of Comprehensive Income, (iv) Consolidated Statements of Changes in Stockholders' Equity, (v) Consolidated Statements of Cash Flows, (vi) Notes to Consolidated Financial Statements, and (vii) Schedule II – Valuation and Qualifying Accounts.
104		Cover Page Interactive Data File (formatted in iXBRL and contained in Exhibit 101)

* Filed herewith

(P) Indicates a paper filing with the SEC.

ITEM 16. FORM 10-K SUMMARY

ADTRAN has elected not to provide a summary of the information contained in this report at this time.

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 25, 2020.

ADTRAN, Inc.
(Registrant)

By: /s/ Michael Foliano
Michael Foliano
Senior Vice President of Finance and
Chief Financial Officer
(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 25, 2020.

<u>Signature</u>	<u>Title</u>
<u>/s/ Thomas R. Stanton</u> Thomas R. Stanton	Chief Executive Officer and Chairman of the Board (Principal Executive Officer)
<u>/s/ Michael Foliano</u> Michael Foliano	Senior Vice President of Finance and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)
<u>/s/ H. Fenwick Huss*</u> H. Fenwick Huss	Director
<u>/s/ Gregory McCray*</u> Gregory McCray	Director
<u>/s/ Anthony Melone*</u> Anthony Melone	Director
<u>/s/ Balan Nair*</u> Balan Nair	Director
<u>/s/ Roy J. Nichols*</u> Roy J. Nichols	Director
<u>/s/ Jacqueline H. Rice*</u> Jacqueline H. Rice	Director
<u>/s/ Kathryn A. Walker*</u> Kathryn A. Walker	Director

*By: /s/ Michael Foliano
Michael Foliano as Attorney in Fact

ADTRAN, INC.
SCHEDULE II
VALUATION AND QUALIFYING ACCOUNTS

<i>(In thousands)</i>	Balance at Beginning of Period	Charged to Costs & Expenses	Deductions	Balance at End of Period
Year ended December 31, 2019				
Allowance for Doubtful Accounts	\$ 128	38	128	\$ 38
Inventory Reserve	\$ 30,009	5,893	1,740	\$ 34,162
Warranty Liability	\$ 8,623	4,569	4,798	\$ 8,394
Deferred Tax Asset Valuation Allowance	\$ 5,816	43,560	760	\$ 48,616
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

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

The following description of our securities is intended as a summary only. This description is based on our certificate of incorporation, as amended (the “Certificate of Incorporation”), our bylaws, as amended (the “Bylaws”), and applicable provisions of the Delaware General Corporation Law (the “DGCL”). This summary is not complete and is qualified in its entirety by reference to the Certificate of Incorporation and the Bylaws, each of which is filed as an exhibit to this Annual Report on Form 10-K. We encourage you to read the Certificate of Incorporation, the Bylaws and the applicable provisions of the DGCL for additional information.

As used herein, the terms “we,” “our” and “us” refer to ADTRAN, Inc.

General

Our authorized capital stock consists of 200,000,000 shares of common stock, par value \$0.01 per share.

Common Stock

Holders of our common stock are entitled to one vote for each share held on all matters properly submitted to a vote of stockholders, including the election of directors, and do not have cumulative voting rights. The election of directors by our stockholders shall be determined by a majority of the votes cast by the stockholders entitled to vote on the election. All of our common stock outstanding is fully paid and nonassessable. No common stock is subject to call. Holders of our common stock are entitled to receive proportionately any dividends as may be declared by our board of directors. There are no special rights or restrictions of any nature attaching to any of our common stock.

In the event of our liquidation or dissolution, the holders of our common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities. Holders of our common stock have no preemptive, subscription, redemption or conversion rights.

Indemnification of Officers and Directors

The Certificate of Incorporation contains provisions for the indemnification of our directors, officers, employees and certain other agents to the fullest extent permitted by the DGCL. These provisions may have the practical effect in certain cases of eliminating the ability of stockholders to collect monetary damages from indemnified individuals.

Provisions of the Certificate of Incorporation, the Bylaws and the DGCL That May Have Anti-Takeover Effects

The Certificate of Incorporation, the Bylaws and the DGCL contain certain provisions that are intended to enhance the likelihood of continuity and stability in the composition of our board of directors. These provisions are intended to avoid costly takeover battles, reduce our vulnerability to a hostile change of control and enhance the ability of our board of directors to maximize stockholder value in connection with any unsolicited offer to acquire us. However, these provisions may have an anti-takeover effect and may delay, deter or prevent a merger or acquisition of us by means of a tender offer, a proxy contest or other takeover attempt that a stockholder might consider in its best interest, including those attempts that might result in a premium over the prevailing market price for the shares of common stock held by stockholders.

Authorized but Unissued Common Stock. The authorized but unissued shares of our common stock are available for future issuance without stockholder approval, subject to any limitations imposed by the rules of any stock exchange on which our securities may be listed. These additional shares may be used for a variety of corporate finance transactions, acquisitions and employee benefit plans. The existence of authorized but unissued and unreserved shares of our common stock could make more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

Special Meeting of Stockholders. The Certificate of Incorporation and the Bylaws provide that, except as otherwise required by law, special meetings of our stockholders can only be called by our chairman of the board, our chief executive officer, our president or our board of directors.

Delaware Business Combination Statute. We are subject to Section 203 of the DGCL. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a “business combination” with any “interested stockholder” for three years following the date that the person became an interested stockholder, unless the interested stockholder attained such status with the approval of our board of directors or unless the business combination is approved in a prescribed manner. A “business combination” includes, among other things, a merger or consolidation involving us and the “interested stockholder” and the sale of more than 10% of our assets. In general, an “interested stockholder” is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person.

Transfer Agent and Registrar

American Stock Transfer & Trust Company, LLC is the transfer agent and registrar for our common stock.

Exchange Listing

Our common stock is traded on the Nasdaq Global Select Market under the symbol “ADTN.”



Corporate Office
901 Explorer Blvd.
Huntsville, AL 35806

U.S. Mail
P.O. Box 140000
Huntsville, AL 35814-4000

Toll Free: 1 800 8ADTRAN
Telephone: 256 963.8000
www.adtran.com

[Insert Date]

Dear [Insert Name of Participant]:

I am pleased to inform you that you have been selected to participate in the ADTRAN, Inc. Variable Incentive Compensation Plan for [Insert Year]. Your 100% target bonus amount is [Insert Dollar Amount]. This one-time bonus payment will be calculated as described in the ADTRAN, Inc. Variable Incentive Compensation Program (Exhibit A) attached on the following page of this document, with [Insert Percentage] based on corporate results and [Insert Percentage] based on your personal goals. The personal goal elements described in the plan will be defined on Exhibit B.

Enclosed with this letter is an Employee Clawback Agreement that must be signed and returned to Joia Thompson by [Insert Date].

Any bonus amount that is achieved will be paid in [Insert Quarter] of [Insert Year]. You must be employed by ADTRAN at the time of payment. Please contact Joia Thompson if you have questions regarding this information, and thank you again for your continued contributions to ADTRAN's ongoing success.

Sincerely,

/s/Thomas R. Stanton

Thomas R. Stanton
Chairman and Chief Executive Officer
ADTRAN, INC.

Exhibit 10.3(k)



Corporate Office
961 Explorer Blvd.
Huntsville, AL 35896

U.S. Mail
P.O. Box 140000
Huntsville, AL 35814-0000

Toll Free: 1 800 9ADTRAN
Telephone: 256 963.8000
www.adtran.com

[Insert date]

[Insert name]

[Insert address]

Dear [Insert Name]:

I am pleased to inform you that you have been granted an award of [Insert number of stock options] stock options at an exercise price of \$[Insert price] pursuant to the ADTRAN, Inc. 2010 Directors Stock Plan (the "Plan"). The award is subject to the terms of the Plan and a related award agreement, both of which can be found on the Plan's online portal, Morgan Stanley StockPlan Connect (<https://www.stockplanconnect.com/>).

In order to confirm your award, please visit the portal and follow the relevant instructions to acknowledge and accept it. If you have any questions, please contact Gayle Ellis at (256) 963-8220 or gayle.ellis@adtran.com.

ADTRAN, INC.

/s/ Thomas R. Stanton

Thomas R. Stanton
Chairman of the Board and Chief Executive Officer



Corporate Office
901 Explorer Blvd.
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www.adtran.com

Exhibit 10.3(i)

[Insert date]

Dear [Name of Participant]:

I am pleased to inform you that you have been granted an award of [Number of Shares Awarded] shares of restricted stock pursuant to the ADTRAN, Inc. 2010 Directors Stock Plan (the "Plan"). The award is subject to the terms of the Plan and a related award agreement, both of which can be found on the Plan's online portal, Morgan Stanley StockPlan Connect (<https://www.stockplanconnect.com/>). In order to confirm your award, please visit the portal and follow the relevant instructions to acknowledge and accept it.

Additionally, the award of restricted stock you received effective [Insert Date] vested on [Insert Date]. We are preparing to transfer the final award stock shares to your designated account. Please complete Attachment A to document your share transfer instructions for our files and return to Meaghan Morris at (256) 963-6315.

Your original grant was [Number of Shares] shares. As a result of quarterly dividend credits earned during [Year], the final award will be [Number of Shares] shares, plus a cash payment for the equivalent of [Number of Shares] fractional shares [Dollar amount to Receive] associated with the dividend credits. Fractional shares are paid in cash in accordance with the plan rules. The amount of cash payment is based on the closing price of ADTRAN's stock on [Insert Date] of [Price per Share] per share.

Your cost basis of the shares awarded to you is [Insert Price per Share] per share. This award will be reported to you as income on the [Insert Year] Form 1099, which will be mailed to you by [Insert Date]. The cash amount for the fractional share will be added on your [Insert Year] Form 1099.

If you have any questions, please contact Meaghan Morris at (256) 963-6315 or meaghan.morris@adtran.com.

ADTRAN, INC.

/s/ Thomas R. Stanton
Thomas R. Stanton
Chairman of the Board and Chief Executive Officer



Corporate Office
901 Explorer Blvd.
Huntsville, AL 35806

U.S. Mail
P.O. Box 140000
Huntsville, AL 35814-0000

Toll Free: 1 800 9ADTRAN
Telephone: 256 963 8000
<http://www.adtran.com>

Dear Employee,

Congratulations! On [Insert date] the ADTRAN Board of Directors met and approved a grant of stock options pursuant to the ADTRAN, Inc. 2015 Employee Stock Incentive Plan (the "Plan"). You have been awarded [Insert number of options] stock options at an exercise price of \$[Insert price]. Your options are expected to be live on Morgan Stanley Smith Barney Benefit Access by [Insert date]. Please log-on to Morgan Stanley Smith Barney Benefit Access at: <https://www.benefitaccess.com> after [Insert date] to review and accept your grant. If you have difficulties accessing your account, you may contact Morgan Stanley Smith Barney at 404-266-6390 and ask a stock plan representative to assist you. (If you are outside the United States, please call +1-210-677-3712 between 8am and 8pm U.S. Eastern Time to speak with a stock plan representative.)

Upon accessing your account, the 'Alerts and Messages' screen should pop-up. If you do not receive a pop-up, please click on the 'Alerts and Messages' tab. The alert will guide you through the process of viewing and accepting your new grant, as well as completing any other necessary information, through a series of online instructions.

If you are receiving options for the first time, you should receive an email by [Insert date] from Morgan Stanley Smith Barney with full instructions on how to activate your online account.

PLEASE NOTE: You MUST accept your grant through Morgan Stanley Smith Barney Benefit Access Online for the grant to be valid and exercisable. If you do not accept your grant, it may result in cancellation of the grant.

To view the Plan prospectus, which summarizes the terms and conditions of the Plan, select the 'Document Library' tab from your Accounts Summary page, click on 'Stock Options' and then '2015 Employee's Plan Prospectus'. If you are employed by ADTRAN outside of the U.S., additional information about the tax consequences of your grant is included with the prospectus at the same location.

If you have any questions, or need further assistance, please contact Gayle Ellis at +1-256-963-8220 or via email at gayle.ellis@adtran.com.



ADTRAN GmbH
Jean-Monnet-Strasse 4
10557 Berlin
Germany

U.S. Mail
P.O. Box 140000
Huntsville, AL 35814-4000

Toll Free: 1 800 9ADTRAN
Telephone: 256 963.8000
<http://www.adtran.com>

SERVICE AGREEMENT

entered into by and between

ADTRAN GmbH

Jean-Monnet-Straße 4, 10557 Berlin

represented by its shareholder meeting
- hereinafter referred to as the "**Company**" -

and

Dr. Eduard Scheiterer

[address]

- hereinafter referred to as "**Mr Scheiterer**" -

- jointly referred to as "Parties" -

Preamble

Mr Scheiterer has been appointed as Managing Director of the Company effective 5 May 2012. The Parties' employment relationship is currently governed by the Service Agreement dated 4 May 2012.

Since 1 January 2016, Mr Scheiterer is working both as Managing Director for the Company in Germany and as Executive Officer for ADTRAN Inc., 900 Explorer Boulevard, Huntsville, AL, 35806, USA (hereinafter **ADTRAN Inc.**). Mr Scheiterer's services for ADTRAN Inc. are governed by the agreement between Mr Scheiterer and ADTRAN Inc. dated 1 January 2016. As a consequence, Mr Scheiterer has been based in Huntsville (Alabama, USA).

Mr Scheiterer and ADTRAN Inc. now mutually agreed to terminate their employment relationship with effect as per 14 July 2019. To this effect, a termination agreement was signed on 18 March 2019. As a consequence, Mr Scheiterer shall be based in Berlin (Germany) as of 15 July 2019.

Henceforth, the Parties' employment relationship (*Anstellungsverhältnis*) and Mr Scheiterer's services for ADTRAN Inc. shall be governed exclusively by the following Service Agreement, which shall replace or result in the termination of any prior arrangements.

Art. 1
Appointment / Area of Responsibility

1. Mr Scheiterer shall continue his services as managing director (*Geschäftsführer*) of the Company based on this Service Agreement.
In addition, Mr Scheiterer shall continue to serve as Senior Vice President of Research and Development for ADTRAN Inc. Mr. Scheiterer will head-up the European development operations as well as help the Sales and Services organizations to enhance ADTRAN's focus in Europe. In this capacity, he will report directly to CEO Tom Stanton.
The Parties agree that Mr Scheiterer's services for ADTRAN Inc. and/or affiliated companies does not result in any service or employment relationship with these legal entities.
2. The assignment of tasks and departmental responsibilities shall be determined by the Schedule of Responsibilities of the Management of the Company. The Schedule of Responsibilities may be amended at any time to reflect the development of the Company as well as its operational requirements.
Irrespective of any assignment of departmental responsibilities, Mr Scheiterer bears joint responsibility for the overall management of the Company.
3. Mr Scheiterer shall perform his duties and responsibilities in compliance with all statutory provisions, in particular in compliance with the German Limited Liability Companies Act (*GmbH-Gesetz*) as well as the articles of association of the Company and the "Code of Conduct", as amended from time to time.
Mr Scheiterer shall observe the local laws and statutes of all countries where he is acting on behalf of the Company, in particular, the UK Anti-Bribery Act and the US FCPA.
Finally, Mr Scheiterer shall observe any instructions of the shareholder meeting with respect to the conduct of business and the representation of the Company.
4. Mr Scheiterer shall devote all of his efforts, professional know-how and experience to the Company. He shall not be bound to fixed working hours. However, he shall work for the Company beyond the regular working times at any time as the Company's business interest demand.
5. Mr Scheiterer shall represent the Company solely. The Company reserves the right at any time to appoint further managing directors and to establish a different arrangement regarding the Company's representation.
6. Mr Scheiterer's regular place of work shall be Berlin; he shall be required to travel extensively for business purposes.

Art. 2
Compensation

1. Mr Scheiterer shall receive for his services a fixed annual salary in the amount of

EUR 275,200.84
(in words: Euro Two hundred seventy-five thousand, two hundred and eighty-four one hundredths) gross, payable in twelve equal installments, at the end of each month.
 2. Mr Scheiterer continues to receive a variable bonus in accordance with the provisions of the "Variable Incentive Compensation" ("VIC"). The maximum bonus to be achieved is 45% of the fixed annual salary in accordance with Art. 2.1, depending on the achievement of the Company's objectives and Mr Scheiterer's personal targets.
Thus, the target bonus shall currently amount to

EUR 123,840.38
(in words: Euro One hundred twenty-three thousand, eight hundred forty and thirty-eight one hundredths) gross in case of full achievement of the relevant targets.
The bonus shall be due and payable no later than six weeks after approval of the annual financial statements (*Feststellung des Jahresabschlusses*) by the shareholders' meeting.
-

3. In addition, the Company shall offer Mr Scheiterer the opportunity to continue his participation in the "ADTRAN 2015 Employee Stock Incentive Plan" ("Incentive Plan") of ADTRAN Inc.
4. The compensation provided for in Art. 2.1 above shall be deemed full consideration for all services performed under this Service Agreement, including any services Mr Scheiterer may for operational reasons be required to perform outside the Company's regular business hours and any services Mr Scheiterer renders to ADTRAN Inc and affiliated companies.
5. If the Parties' employment relationship does not subsist for full twelve months in any given calendar year, the compensation stipulated herein shall be payable on a *pro-rata* basis
6. When in conflict, the requirements and stipulations of the "Variable Incentive Compensation" ("VIC") plan and the "ADTRAN 2015 Employee Stock Incentive Plan" ("Incentive Plan") of ADTRAN Inc. supersede the provisions of Art. 2.5.

Art. 3
Car Allowance / Benefits in Kind / Expenses

1. The Company shall provide Mr Scheiterer with a monthly company car allowance in the amount of EUR 800,- (gross). The Company will reimburse Mr. Scheiterer for the costs of insurance, required maintenance and fuel expense.
2. The Company shall provide Mr Scheiterer with a monthly commuting allowance in the amount of EUR 3,000,- (gross). This allowance shall be deemed full compensation of any additional expenses incurred by Mr Scheiterer due to the Company's relocation from Munich to Berlin.
3. The Company shall reimburse Mr Scheiterer for all reasonable costs of travel incurred within the scope of his employment, in accordance with the Company's guidelines, as applicable from time to time and in compliance with applicable tax laws.
4. The Company shall provide Mr Scheiterer with all necessary technical equipment (such as laptop, smartphone, etc.) for both professional and private use in order to enable mobile working.
5. For the duration of this Service Agreement, the Company shall take out and maintain an adequate Directors' and Officers' Liability Insurance within the framework of ADTRAN's group insurance for the benefit of Mr Scheiterer.
6. The Company shall take out an insurance for the benefit of Mr Scheiterer. This accident insurance shall cover both professional and private risks. The insured sum shall amount to EUR 273,500.-- in the event of death. Mr Scheiterer's entitlement to insurance benefits is exclusively subject to the insurance terms and conditions.
7. The Company shall bear 50% of the costs for a private health insurance, limited to 50 % of the average maximum amount for the statutory health insurance (Sec. 257 German Social Security Code V).
8. Mr Scheiterer shall be responsible for all wage taxes payable on benefits in kind provided by the Company.

Art. 4
Prevention from Work /
Continued Payment of Compensation in the Event of Illness or Accident

1. In the event that he is prevented from the performance of his duties for a considerable period of time Mr Scheiterer shall inform the Company without undue delay, also stating the reasons for such incapacity.

Furthermore, Mr Scheiterer shall inform the Company without undue delay, if it is foreseeable that he will be restricted in or prevented from the performance of his duties due to a diagnosed illness, an impending hospital stay, a rehab measure or any other development impairing his capacity to work.

Mr Scheiterer shall also inform the Company about any pressing tasks which need to be dealt with urgently.
 2. In the event of his temporary disability due to illness, accident, or any other cause not due to the fault of Mr Scheiterer, Mr Scheiterer shall be entitled to continued payment of the fixed annual salary stipulated in Art. 2.1 for an uninterrupted period of 12 months or until termination of this Service Agreement, whichever event occurs first.
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Art. 5
Vacation

Mr Scheiterer shall be entitled to a vacation of 30 working days per calendar year. For the purposes of this provision, "working day" shall mean all business days with the exception of Saturdays. The duration and dates of each vacation shall be coordinated with the other managing directors and communicated to the Company. The vacation days that have accrued during any one vacation year shall be used by March 31 of the following year; otherwise they shall be forfeited.

Art. 6
Secondary Employment / Non-Compete / Conflicts of Interest

1. Any secondary employment, whether compensated or uncompensated, shall require the prior written approval of the Company. The forgoing provision shall also apply for the participation in other enterprises or if Mr Scheiterer assumes any responsibilities on bodies of enterprises not affiliated with the Company. The foregoing provision shall apply, *mutatis mutandis*, for respective secondary employment Mr Scheiterer has been engaged in before the beginning of this Service Agreement and which he wants to continue.
2. Mr Scheiterer undertakes to refrain from competing with the Company or any affiliated companies for the duration of this Service Agreement. In particular, Mr Scheiterer shall not acquire any interests in competitors of the Company, transact business on behalf of such competitors, be it for his own account or for the account of third parties, or provide any other services to such competitors.

The acquisitions and holding of shares in companies listed on a stock exchange as part of private investment shall be exempt from such non-compete obligation provided that any influence of Mr Scheiterer on the management board of these companies is excluded.
3. Furthermore, Mr Scheiterer undertakes to strictly comply with all insider-trading regulations stipulated by the law and/or by the Company, each as amended from time to time.
4. In the interest of both Parties, Mr Scheiterer shall disclose to the Company any conflict of interests arising in connection with the performance of his duties and responsibilities. The foregoing provision shall apply, in particular, if customers, suppliers or any other business partners of the Company or enterprises affiliated with the Company are relatives, personal friends or close business associates of Mr Scheiterer. The duty of disclosure shall not be limited to cases in which a conflict of interests may have a specific effect on the performance of Mr Scheiterer's duties and responsibilities; rather, the mere appearance of a conflict of interests shall be sufficient to give rise to such a duty.

Art. 7
Duty of Confidentiality

1. Mr Scheiterer shall be obliged to keep strict confidentiality regarding all business secrets of the Company, its affiliate companies or any third party maintaining a business relationship with the aforementioned companies both vis-à-vis third parties and unauthorized Company staff. For the purposes of this provision, "business secrets" shall mean any business, operational, organizational and technical knowledge, procedures and information, which is accessible for a limited staff only and which is not public knowledge.
 2. The obligation to keep strict confidentiality does also apply to any confidential business affairs, which have been explicitly denominated by the Company as such or obviously qualify as confidential business affairs.
 3. Mr Scheiterer shall not grant any third parties access to the Company's records and files.
 4. This duty of confidentiality shall continue to apply also after the termination of this Service Agreement. Insofar as it unfairly restricts Mr Scheiterer's professional advancement, he is entitled to a restriction of the duty of confidentiality against the Company.
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Art. 8
Work Results / Inventions

1. All work results produced by Mr Scheiterer in the performance of his duties and responsibilities shall be the exclusive property of the Company.
2. This applies in particular for any inventions which Mr Scheiterer may develop during the duration of this Service Agreement, if they result from the performance of his duties to the Company or are mainly based on operational assets, previous achievements, inventions, knowledge, know-how or any other expertise or work of the Company or its customers (work-related inventions; *Dienst-erfindungen*).
3. To the extent the respective property rights to the work results are assignable, they shall be assigned to the Company as soon as they are arisen.
4. Furthermore, Mr Scheiterer hereby grants the Company the exclusive and unlimited license to use work results that can be subject to copyright law protection related to his duties as managing director in all forms conceivable now or at a later date. The assignment of the right for use and exploitation shall also notably include the permission for processing and licensing to third parties. This exclusive license shall survive termination of this Service Agreement.
5. Mr Scheiterer expressly waives all other rights in the work results to which he might be entitled as author or other holder of an intellectual property right, notably the right to be named as author/creator, to adaptation and to making the work accessible.
6. Mr Scheiterer shall not be entitled to any additional compensation for the exclusive license granted to the Company hereunder. The fixed annual salary stipulated in Art. 2.1 of this Service Agreement shall be deemed full and adequate consideration for the exclusive license granted to the Company hereunder.

Art. 9
Return of Property

1. Mr Scheiterer will carefully store all business documents which he receives from the Company or from third parties within the scope of his employment relationship as well as the documents and other work products prepared by him, including electronically stored data and data records, and protect them from unauthorized access by third parties. Mr Scheiterer uses these documents exclusively within the scope of his contractually owed services. The making of copies or transcripts for his own purposes is prohibited.
2. Following termination of this Service Agreement or Mr Scheiterer's release from work, Mr Scheiterer shall immediately return to the Company all objects due to the Company or enterprises affiliated with the Company in his possession, including all documents, notes and instruments, including any copies thereof.
3. This obligation applies accordingly to electronic data. Mr Scheiterer shall in such cases transfer to a data carrier any data and programs that were delivered to him in connection with his services and/or that were stored by him in the course of his work and that are stored on any computers he uses for private purposes. Once this has been done, Mr Scheiterer shall deliver such data carriers to the Company and after consultation with the Company irretrievably delete the data/ programs concerned from such private computers.
4. The right to retain any documents or objects defined in this section is hereby expressly excluded. Mr Scheiterer is also not entitled to retain copies or transcripts. Mr Scheiterer shall also not be entitled to any compensation or damages for returning Company property prior to termination of this Service Agreement.

Art. 10
Term of Employment and Termination

1. The Service Agreement shall enter into effect on 15 July 2019 and shall continue until terminated.
 2. The Service Agreement may be terminated by each party subject to a notice period of seven months to the end of a calendar month. However, notice of termination may be given for the first time with effect as per 31 December 2020.
 3. The right to termination for good cause (§ 626 BGB) shall remain unaffected.
 4. Notice of termination shall be effected in writing (§ 623 BGB).
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5. Pursuing legitimate interests, the Company shall have the right at any time, in particular if notice of termination has been given by either party or if the appointment as managing director has ended, to release Mr Scheiterer from his duty to work (such release being either irrevocable or in a form that can be revoked), provided that the Company continues to pay the fixed annual salary due to Mr Scheiterer pursuant to Art. 2.1. In the event of an irrevocable release of Mr Scheiterer from work, the time of such release shall be taken into account in calculating the claim to vacation. For periods of release from work during which continued payment of compensation is not set off against unused vacation claims, any income which he receives from another occupation shall be set off against his compensation claim.

Art. 11
Limitation Period / Summary Procedure

1. All claims of the parties arising from the service relationship and such claims in connection with the service relationship shall lapse if they are not asserted in text form against the other party within three months of the due date.
2. If the opposing party rejects the claim or does not make a statement within two weeks of assertion, the claims shall lapse if they are not asserted in court within three further months of the first assertion.
3. These limitation periods and this expiration clause shall not apply to claims based on injury to life, limb or health and liability based on intentional breaches of duty.
4. The assertion of claims in the summary procedure based on documentary evidence (*Urkundenprozess*) is not permissible.

Art. 12
Final Provisions

1. This Service Agreement between Mr Scheiterer and the Company represents the entirety of and the only arrangement relating to Mr Scheiterer's occupation as managing director for the Company and shall replace or result in the termination of any prior arrangements between the Parties, whether made verbally or in writing, in particular the Service Agreement dated 4 May 2012. There are no side agreements.
 2. Modifications of and/or amendments to this Service Agreement shall only be valid if made in writing. This shall also apply to the cancellation or amendment of the requirement of the written form. Individual agreements between the Parties take priority (§ 305b German Civil Code).
 3. If any provision of this Agreement should be or become wholly or partially void (*nichtig*), ineffective (*unwirksam*) or unenforceable (*undurchsetzbar*), the validity, effectiveness and enforceability of the other provisions of this Agreement shall not be affected thereby. Any such invalid, ineffective or unenforceable provision shall be deemed replaced by such valid, effective and enforceable provision as comes closest to the economic intent and purpose of the invalid, ineffective or unenforceable provision as regards subject-matter, extent (*Maß*), time, place and scope (*Geltungsbereich*). The aforesaid shall apply mutatis mutandis to any gap (*Lücke*) in this Agreement.
 4. This Service Agreement shall be governed by German law.
 5. Place of jurisdiction for all disputes arising out of or in connection with this Service Agreement shall be the registered office of the Company.
 6. This Service Agreement has been provided to the Parties in both German and English. The German version shall prevail.
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June 22, 2019
(place, date)

June 25, 2019
(place, date)

ADTRAN GmbH
represented by its shareholders' meeting

/s/James D. Wilson
(James D. Wilson)

/s/ Eduard Scheiterer
(Eduard Scheiterer)

ADTRAN, INC. CLAWBACK AGREEMENT

The Board of Directors of the Company (the "**Board**") adopted a policy that requires executive officers who receive incentive based compensation to agree to the terms of this Clawback Agreement (the "**Agreement**"). The Policy provides for the recoupment of certain executive incentive based compensation received in error as determined by accounting restatements resulting from material noncompliance with financial reporting requirements under the federal securities laws (the "**Policy**"). The Policy and this Agreement are designed to comply with Section 10D of the Securities Exchange Act of 1934 (the "**Exchange Act**").

1. Covered Executives. The Policy applies to the Company's current and former executive officers, as determined by the Board in accordance with Section 10D of the Exchange Act and the listing standards of the national securities exchange on which the Company's securities are listed, and such other executives who may from time to time be deemed subject to the Policy by the Board ("**Covered Executives**").

2. Incentive Compensation. For purposes of the Policy and this Agreement, Incentive Compensation means any of the following provided that such compensation is granted, earned, or vested based wholly or in part on the attainment of a financial reporting measure, annual bonuses and other short- and long-term cash incentives; stock options; stock appreciation rights ("**SAR**"); restricted stock; restricted stock units ("**RSU**"); performance shares; and performance units. Financial reporting measures include: Company stock price; Total Shareholder Return; revenues; net income; earnings before interest, taxes, depreciation, and amortization (EBITDA); funds from operations; liquidity measures such as working capital or operating cash flow; return measures such as return on invested capital or return on assets; earnings measures such as earnings per share.

3. Effective Date. This Agreement shall apply to Incentive Compensation that is approved, awarded or granted to Covered Executives on or after January 1, 2015 or the Covered Executive's later date of employment ("**Effective Date**").

4. Recoupment; Accounting Restatement. In the event the Company is required to prepare an accounting restatement of its financial statements due to the Company's material noncompliance with any financial reporting requirement under the securities laws, the Board requires reimbursement or forfeiture of any excess Incentive Compensation received by the Covered Executive during the three completed fiscal years immediately preceding the date on which the Company is required to prepare an accounting restatement.

5. Excess Incentive Compensation; Amount Subject to Recovery. The amount to be recovered will be the after-tax value of the excess of the Incentive Compensation paid to the Covered Executive based on the erroneous data over the Incentive Compensation that would have been paid to the Covered Executive had it been based on the restated results, as determined by the Board. If the Board cannot determine the after-tax amount of excess Incentive Compensation received by the Covered Executive directly from the information in the accounting restatement, then the Board will make its determination based on a reasonable estimate of the effect of the accounting restatement.

6. Method of Recoupment. The Board will determine, in its sole discretion, the method for recouping excess Incentive Compensation hereunder which may include, without limitation: (a) requiring reimbursement of cash Incentive Compensation previously paid; (b) seeking recovery of any gain realized on the vesting, exercise, settlement, sale, transfer, or other disposition of any equity-based awards; (c) offsetting the recouped amount from any compensation otherwise owed by the Company to the Covered Executive; (d) cancelling outstanding vested or unvested equity awards; and (e) taking any other remedial and recovery action permitted by law, as determined by the Board.

7. **No Indemnification.** The Company shall not indemnify any Covered Executives against the loss of any incorrectly awarded Incentive Compensation.

8. **Interpretation.** Covered Executive understands that the Board is authorized to interpret and construe the Policy and to make all determinations necessary, appropriate, or advisable for the administration of the Policy and this Agreement. It is intended that the Policy be interpreted in a manner that is consistent with the requirements of Section 10D of the Exchange Act and any applicable rules or standards adopted by the Securities and Exchange Commission or any national securities exchange on which the Company's securities are listed.

9. **Other Recoupment Rights.** The Board intends that the Policy will be applied to the fullest extent of the law. The Board may require that any employment agreement, equity award agreement, or similar agreement entered into on or after the Effective Date shall, as a condition to the grant of any benefit thereunder, require a Covered Executive to execute this Agreement agreeing to the terms of the Policy. Any right of recoupment under the Policy is in addition to, and not in lieu of, any other remedies or rights of recoupment that may be available to the Company pursuant to the terms of any similar policy in any employment agreement, equity award agreement, or similar agreement and any other legal remedies available to the Company.

10. **Impracticability.** The Board shall recover any excess Incentive Compensation in accordance with the Policy unless such recovery would be impracticable, as determined by Board after considering any applicable regulation of the Securities and Exchange Commission and/or the listing standards of the national securities exchange on which the Company's securities are listed.

AGREED TO as of the Effective Date.

EXECUTIVE:

By: _____ Title: _____

Effective Date: _____

September 25, 2018

Dear Raymond:

We are pleased to extend to you the following offer of employment with ADTRAN Inc., as a Chief Information Officer reporting to Thomas R. Stanton, located in ADTRAN Huntsville HQ.

Your compensation will include a bi-weekly paid salary of USD \$10,769.23 (gross) resulting in an annualized salary of USD \$280,000.00 (gross).

You will be recommended to participate in the Annual Incentive Compensation Plan with a target incentive compensation of \$125,000.00 or 45% of base salary. In addition you will receive:

- 3 weeks of accrued vacation
- Eligibility for life, health, dental & disability insurance

This offer of employment contains a relocation package E. Please refer to the attachment for details. If you elect to voluntarily terminate your employment with ADTRAN, or are terminated for cause during the 12-month period immediately following your start date in your new location, you will be required to repay ADTRAN all costs associated with your relocation. According to IRS regulations some elements of relocation expenses are considered taxable income. You should consult your tax person regarding the possible tax impacts of your relocation.

In addition, you will receive a hiring bonus of \$25,000.00, gross, paid within the first two payroll cycles of your hire date. If you voluntarily leave the employ of ADTRAN within the first twelve months of receiving the hiring bonus, you will be responsible to reimburse the Company for the hiring bonus paid on your behalf.

Subject to Board of Directors' approval, you will be granted: A restricted stock unit award with respect to 2,000 shares of ADTRAN common stock vesting over a four year period.

You are eligible to enroll in the ADTRAN 401(k) plan upon hire. You may defer up to 60% of your eligible income up to the IRS annual maximum. ADTRAN, will match eligible 401(k) contributions after a Plan participant completes 12 months of service. Matching contributions will equal 100% of the first 3% contributed and 50% of the next 2% contributed up to a maximum matching contribution of 4%. Company matching contributions will begin on the first anniversary of employment and are applied retroactively to all contributions made during the calendar year in which you become match eligible.

This offer is contingent upon the successful outcome of the following:

- Background check
- Substance Abuse examination
- Your employment not being encumbered by a "non-compete" or similar agreement.

Your tentative start date will be November 5, 2018.

Your decision should be given to us within seven days of the offer date. ADTRAN is an at will employer which means that you or the Company may terminate employment, with or without cause, with reasonable notice.

Raymond, we are very impressed with your background and experience and feel that you will make a significant contribution to the growth and expansion of ADTRAN. Please acknowledge your decision by either accepting or declining the offer below.

Sincerely,

/s/ Jason A. Couch

Jason A Couch
Human Resources Recruiter ADTRAN, Inc.

/s/ Raymond Harris



November 29, 2018

Dear Jeff,

As you know, ADTRAN, Inc. ("ADTRAN") and SmartRG, Inc. ("SmartRG") are in negotiations regarding ADTRAN's acquisition of SmartRG (the "Transaction"). Given the many details that need to be addressed and approvals that need to be obtained, the closing date of the Transaction is uncertain at this point. It is possible, however, that the Transaction, if consummated, could close as early as November 30, 2018. If and when the closing of the Transaction occurs, SmartRG will become a wholly owned subsidiary of ADTRAN.

Conditioned upon and effective as of the successful closing of the Transaction (the "Effective Date"), and assuming you remain an active employee of SmartRG in good standing immediately up to the Effective Date, ADTRAN is pleased to offer you continued employment with SmartRG, Inc., as a wholly-owned subsidiary of ADTRAN, with the following exceptions: a) your position will be VP, General Manager; and b) you will report to Jay Wilson, SVP, Technology & Strategy. Your start date would coincide with the Effective Date (i.e., the closing of the Transaction).

Between the Effective Date and April 1, 2019 your compensation shall be as follows:

1. Your compensation will include a bi-monthly paid salary of \$9,375.00 (gross) resulting in an annualized salary of \$225,000.00 (gross).
2. You will be eligible to earn a pro-rata portion of annual Management By Objectives incentive bonus of up to an annualized aggregate of \$50,000.00 ("MBO Bonus"), less required deductions for state and federal withholding tax, social security and all other employment taxes and payroll deductions, payable on a quarterly basis (i.e., up to \$12,500.00 payable quarterly), based on your achievement of these management goals and objectives to this schedule:

Q4 2018 MBO \$4,167.00 (prorated 1 month of \$50k annual)

1. Revenue at or above \$3.368mm (25%)
2. EBITDA at or above 195k (25%)
3. Strategic Initiative
 - a. Suggestion 1 (25%) - Successfully transition 85% plus of the SRG team to Adtran.
 - b. Suggestion 2 (25%) - Develop and commit to synergies plan to be executed 1H/2019.

Q1 2019 MBO \$12,500.00 (prorated 1 quarter of \$50k annual)

1. Q1/19 Revenue at or above \$8,952 (25%)
2. EBITDA at or above \$399k (25%)
3. Strategic Initiative
 - a. Suggestion 1 (25%)- Develop and deliver converged ADTRAN/SmartRG product roadmap
 - b. Suggestion 2 (25%)- Build, present and begin execution of 2019 CPE sales strategy with John Neville.

3. You will be eligible to earn a pro-rata portion of an annualized Annual Bonus of \$75,000.00 based on your achievement of these management goals and objectives to this schedule:

Q4 2018 Annual Bonus of \$6,250 (prorated 1 month of \$75k annual)

1. Total Dec-18 Operating Expenses at or below \$778k (33%)
2. Software revenue \$400k+ (33%)
3. First order from TelMex (33%)

Annual Bonus of \$ 18,750 (prorated 1 quarter of \$75k annual)

1. Total Q1/19 Operating Expenses at or below \$3,156 (33%) [Appropriate adjusted number to be determined]
2. Software revenue \$1.729k+ (33%)
3. First Strategic ADTRAN international order (non-north America)

4. A recommendation will be made to the Compensation Committee of the ADTRAN Board of Directors to grant you a restricted stock unit award of 7,150 shares of ADTRAN Inc. common stock under the ADTRAN 2015 Employee Stock Incentive Plan (the "Plan"), vesting over a four-year period. The Compensation Committee has complete discretion to grant equity, although we expect that the Compensation Committee to approve this grant at its next meeting immediately following the recommendation made by ADTRAN.
5. Until April 1, 2019, if you are terminated without cause, you shall receive a severance payment equivalent to nine (9) months of your base salary then in effect, less any applicable state and federal withholding deductions, payable in a reasonable amount of time thereafter; provided that you execute a Separation Agreement and General Release of claims in accordance with ADTRAN's then-current practice and customary terms. Further, upon such a termination, ADTRAN's Board of Directors may, in its sole discretion, approve the accelerated vesting of any outstanding and unvested restricted stock units. After April 1, 2019, as we work to transition all terms to be commensurate with ADTRAN standard terms, it's our desire to bring your severance terms in line with our standard officer agreement.

After April 1, 2019, all SRG employment compensation will transition to terms commensurate with ADTRAN's then-current compensation model. Your specific compensation model will transition to terms commensurate with the ADTRAN officer's program. We expect your total cash compensation after April 1 to be equal to or greater than your current model as we consider enrolling you in one or more of our incentive compensation programs. More detail about these programs is provided in the attachments. Please note that participation in some of these programs is dependant on board approval.

Additionally, you will receive or be eligible for ADTRAN employment benefits and vacation accrual January 1, 2019.

This offer will be contingent upon the successful outcome of the following:

- (i) a background check; and
- (ii) substance abuse examination; and
- (iii) your employment not being encumbered by a "non-compete," "non-solicitation" or similar agreement.

Further, this offer of employment and your acceptance (if any) is conditioned upon the closing of the proposed Transaction, which is currently scheduled to close no earlier than November 30, 2018. If the discussions between the parties are terminated or the closing of the Transaction has not occurred on or before December 15, 2018 the offer (and your acceptance, if any) will be automatically rescinded and of no further force or effect, unless you receive written notice (if any) from ADTRAN extending the term of the offer.

Should you choose to accept this offer, your continued employment with SmartRG, as a wholly owned subsidiary of ADTRAN, on and after the Effective Date, will be upon the terms of this offer letter. The terms of this offer letter will supersede any existing terms of employment between you and SmartRG as of the Effective Date, including, but not limited to, prior terms regarding your base salary, commission plans, bonus eligibility, stock options, etc. By signing below, you agree that any previous offers of employment, employment agreements, bonus arrangements, and the like between you and SmartRG (including, but not limited to, the Executive Employment Agreement dated May 1, 2012, as amended, between you and SmartRG) shall terminate as of the Effective Date.

Importantly, this letter, including the offer and your acceptance of its terms, is not a contract, express or implied, guaranteeing employment, or employment for any duration. If you choose to accept this offer and the closing of the Transaction occurs, you will be an "at will" employee, and your continued employment with SmartRG after the Effective Date will be voluntarily entered into and will be for no specified period. As a result, you will be free to resign at any time, for any reason or for no reason, as you deem appropriate. SmartRG will have a similar right and may conclude our employment relationship with you at any time, with or without cause. In addition, we may withdraw this offer at any time, with or without notice to you and, if not accepted by you, in writing, on or before Thursday, November 29, 2018. 5pm CST, this offer will be deemed to have been rejected by you.

Finally, as you know, the proposed Transaction is highly confidential and, as such, you should maintain the confidentiality of the Transaction (and the fact that discussions are underway regarding the Transaction) and not discuss or disclose the Transaction with or to anyone, other than your financial or legal advisors. To the extent that you discuss this letter with your financial or legal advisors, you should ensure that they maintain the confidentiality of these matters. In addition to the confidentiality requirements imposed on you as part of your employment with SmartRG, given that ADTRAN is a publicly-traded company, you are subject to a host of civil and criminal regulations insider trading) that could be violated by inappropriate disclosure or use of information related to the Transaction.

Jeff, we know how vital you are to the growth and expansion of SmartRG and ADTRAN. Please acknowledge your decision by either accepting or declining the offer below.

Sincerely,
/s/Joia Thompson
Vice President of Human Resources ADTRAN, Inc.

ACCEPTED:

/s/ Jeff McInnis
Jeff McInnis
Date: Nov 29, 2018



November 26, 2018

Dear Ronald:

We are pleased to extend to you the following offer of employment with ADTRAN Inc., as a Senior Vice President Operations reporting to Thomas R. Stanton, located in ADTRAN Huntsville HQ.

Your compensation will include a bi-weekly paid salary of USD \$12,115.38 (gross) resulting in an annualized salary of USD \$315,000.00 (gross).

You will be recommended to participate in the Annual Incentive Compensation Plan with a target incentive compensation of \$141,750.00 or 45% of base salary. In addition you will receive:

- 3 weeks of accrued vacation
- Eligibility for life, health, dental & disability insurance

This offer of employment contains a relocation package E. Please refer to the attachment for details. If you elect to voluntarily terminate your employment with ADTRAN, or are terminated for cause during the 12-month period immediately following your start date in your new location, you will be required to repay ADTRAN all costs associated with your relocation. According to IRS regulations some elements of relocation expenses are considered taxable income. You should consult your tax person regarding the possible tax impacts of your relocation.

In addition, you will receive a hiring bonus of \$25,000.00, gross, paid within the first two payroll cycles of your hire date. If you voluntarily leave the employ of ADTRAN within the first twelve months of receiving the hiring bonus, you will be responsible to reimburse the Company for the hiring bonus paid on your behalf.

Subject to Board of Directors' approval, you will be granted:

- A restricted stock unit award with respect to 2,000 shares of ADTRAN common stock vesting over a four-year period.
- A performance stock unit award with respect to 2,000 shares of ADTRAN, Inc. common stock vesting over a three- year period.

You are eligible to enroll in the ADTRAN 401(k) plan upon hire. You may defer up to 60% of your eligible income up to the IRS annual maximum. ADTRAN, will match eligible 401(k) contributions after a Plan participant completes 12 months of service. Matching contributions will equal 100% of the first 3% contributed and 50% of the next 2% contributed up to a maximum matching contribution of 4%. Company matching contributions will begin on the first anniversary of employment and are applied retroactively to all contributions made during the calendar year in which you become match eligible.

This offer is contingent upon the successful outcome of the following:

- Background check
- Substance Abuse examination
- Your employment not being encumbered by a "non-compete" or similar agreement

Your tentative start date will be January 28, 2019.

Your decision should be given to us within seven days of the offer date. ADTRAN is an at will employer which means that you or the Company may terminate employment, with or without cause, with reasonable notice.

Ronald, we are very impressed with your background and experience and feel that you will make a significant contribution to the growth and expansion of ADTRAN. Please acknowledge your decision by either accepting or declining the offer below.

Sincerely,

/s/ Jason A. Couch
Jason A. Couch
Human Resources Recruiter ADTRAN, Inc.

/s/ Ronald Centis
Ronald Centis
Enclosure:



August 30, 2019

Dear Dan,

We are pleased to extend to you the following offer of employment with ADTRAN, Inc., as Chief Product Officer reporting to Thomas R. Stanton, located at ADTRAN headquarters, Huntsville, Alabama.

Your compensation will include a bi-weekly paid salary of USD \$15,000 (gross) resulting in an annualized salary of USD \$390,000.00 (gross).

You will be recommended to participate in the Variable Incentive Compensation Plan with a target incentive compensation of \$234,000 or 60% of base salary.

In appreciation for our decision to join us, you will receive a hiring bonus of \$100,00.00 (gross) paid 50% at the 6-month anniversary of your joining date and the remaining 50% at the one-year anniversary. Payout of the bonus requires your successful completion of key objectives to be determined by CEO. If you voluntarily leave the employ of ADTRAN within the first twelve months of your hire date, you will be responsible to reimburse the Company for the hiring bonus paid to you. Additionally, you will be required to reimburse the Company for the hiring bonus paid to you if you fail to relocate your family within twelve months of your hiring date. In the event of extenuating, unforeseen family circumstances that could delay the move of your family (e.g. death, serious medical conditions, etc.), the Company agrees that the requirement to relocate within twelve months may be extended.

In addition, you will receive:

- 3 weeks of accrued vacation
- Eligibility for life, health, dental and disability insurance

This offer of employment contains a relocation package (E). Please refer to the attachment for details. If you elect to voluntarily terminate your employment with ADTRAN, or are terminated for cause during the 12-month period immediately following your start date in your new location, you will be required to repay ADTRAN all costs associated with your relocation. According to IRS regulations some elements of relocation expenses are considered taxable income. You should consult your tax person regarding the possible tax impacts of your relocation.

Subject to Board of Directors' approval, you will be granted:

- A restricted stock unit award with respect to 9,700 shares of ADTRAN common stock vesting over a four-year period.
 - A performance stock unit award with respect to 9,700 shares of ADTRAN common stock vesting over a three-year period.
 - A performance stock unit award with respect to 44,944 shares of ADTRAN common stock vesting over a three-year period. (Overlay- One-Time Performance Share CAGR Award)
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You are eligible to enroll in the ADTRAN 401(k) plan upon hire. You may defer up to 60% of your eligible income up to the IRS annual maximum. ADTRAN will match eligible 401(k) contributions after a plan participant completes 12 months of service. Matching contributions will equal 100% of the first 3% contributed and 50% of the next 2% contributed up to a maximum matching contribution of 4%. Company matching contributions will begin on the first anniversary of employment and are applied retroactively to all contributions made during the calendar year in which you become match eligible.

This offer is contingent upon the successful outcome of the following:

- Background check
- Substance Abuse examination

Your tentative start date will be September 16, 2019.

Your decision should be given to us within seven days of the offer date. ADTRAN is an at-will employer which means that you or the company may terminate employment, with or without cause, with reasonable notice.

Dan, we are very impressed with your background and extensive experience. We are looking forward to the contribution you can make here at ADTRAN.

Please acknowledge your decision by signing this letter below. Sincerely,

/s/ Joia Thompson
Vice President, Human Resources ADTRAN

/s/ Dan Whalen Date: 8/31/19
Daniel T. Whalen

SUBSIDIARIES OF ADTRAN, INC.

December 31, 2019

<u>Name of Subsidiary</u>	<u>Country or State of Incorporation</u>
ADTRAN Networks Pty. Ltd	Australia
ADTRAN Networks Comunicações Ltda.	Brazil
ADTRAN Canada, Inc.	Canada
ADTRAN Networks Canada, Inc.	Canada
ADTRAN d.o.o.	Croatia
ADTRAN International, Inc.	Delaware
ADTRAN Networks Worldwide, Inc.	Delaware
ADTRAN Networks, LLC	Delaware
Bluesocket, Inc.	Delaware
ADTRAN Oy	Finland
ADTRAN GmbH	Germany
ADTRAN Networks M.E.P.E.	Greece
ADTRAN Networks India Private Limited	India
ADTRAN Holdings Ltd.	Israel
ADTRAN S.R.L.	Italy
ADTRAN K.K.	Japan
ADTRAN Networks Sdn Bhd	Malaysia
ADTRAN Networks S.A. de C.V.	Mexico
ADTRAN Networks & Services, S. de R.L. de C.V.	Mexico
ADTRAN Peru S.R.L.	Peru
ADTRAN Sp. z.o.o.	Poland
ADTRAN, Unipessoal Lda.	Portugal
ADTRAN International, Inc. - Saudi Arabia branch	Saudi Arabia
ADTRAN s.r.o.	Slovakia
ADTRAN Proprietary Ltd.	South Africa
ADTRAN Switzerland GmbH	Switzerland
ADTRAN GmbH (Tunisia Permanent Establishment Branch Office)	Tunisia
ADTRAN SARL	Tunisia
ADTRAN Europe Limited	United Kingdom
SmartRG, Inc.	Delaware

Exhibit 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-215218, 333-168419, 333-133927, 333-126734, 333-66000, 333-41458, 333-78417, 333-30375, 333-29899, 333-4808) of ADTRAN, Inc. of our report dated February 25, 2020 relating to the financial statements, financial statement schedule and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

Birmingham, Alabama

February 25, 2020

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that each of the undersigned, being a director of ADTRAN, Inc., a Delaware corporation (the “Company”), by his or her execution hereof or an identical counterpart hereof, hereby constitutes and appoints Thomas R. Stanton and Michael Foliano, and each of them, his or her true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign the Annual Report on Form 10-K of the Company for the fiscal year ended December 31, 2019 and any and all amendments thereto, and any other documents in connection therewith as they or any one of them may deem necessary or desirable, each in such form as they or any one of them may approve, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done, as fully and to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, each of the undersigned has hereunto set his or her hand this 25th day of February, 2020.

/s/ H. Fenwick Huss

H. Fenwick Huss

Director

/s/ Gregory McCray

Gregory McCray

Director

/s/ Anthony Melone

Anthony Melone

Director

/s/ Balan Nair

Balan Nair

Director

/s/Jacqueline H. Rice

Jacqueline H. Rice

Director

/s/Kathryn A. Walker

Kathryn A. Walker

Director

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that the undersigned, being director emeritus of ADTRAN, Inc., a Delaware corporation (the “Company”), by his execution hereof, hereby constitutes and appoints Thomas R. Stanton and Michael Foliano, and each of them, his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign the Annual Report on Form 10-K of the Company for the fiscal year ended December 31, 2019 and any and all amendments thereto, and any other documents in connection therewith as they or any one of them may deem necessary or desirable, each in such form as they or any one of them may approve, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done, as fully and to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, the undersigned has hereunto set his hand this 25th day of February, 2020.

/s/Roy J. Nichols
Roy J. Nichols
Director Emeritus

CERTIFICATIONS

I, Thomas R. Stanton, certify that:

- 1. I have reviewed this Annual Report on Form 10-K of ADTRAN, Inc.;
- 2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
- 3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
- 4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
- 5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's Board of Directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Thomas R. Stanton

Thomas R. Stanton
Chief Executive Officer and Chairman of the Board

I, Michael Foliano, certify that:

1. I have reviewed this Annual Report on Form 10-K of ADTRAN, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's Board of Directors (or persons performing the equivalent functions):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Michael Foliano
Michael Foliano
Senior Vice President of Finance and
Chief Financial Officer

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of ADTRAN, Inc. (the "Company") on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Thomas R. Stanton, Chief Executive Officer and Chairman of the Board of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

- (1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Thomas R. Stanton

Thomas R. Stanton
Chief Executive Officer and Chairman of the Board
Date: February 25, 2020

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of ADTRAN, Inc. (the "Company") on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Michael Foliano, Senior Vice President of Finance and Chief Financial Officer, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

- (1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Michael Foliano

Michael Foliano
Senior Vice President of Finance,
Chief Financial Officer,
Corporate Secretary and Treasurer
Date: February 25, 2020