UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission file number: 001-36146

CommScope Holding Company, Inc.
(Exact name of registrant as specified in its charter)

Delaware (State or other jurisdiction of incorporation or organization)		**27-4332098** (I.R.S. Employer Identification No.)
1100 CommScope Place, SE **Hickory, North Carolina** (Address of principal executive offices)	**28602** (Zip Code)	**(828) 324-2200** (Telephone number)

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

Title of each class	Ticker symbol	Name of each exchange on which registered
Common Stock, par value $.01 per share	COMM	Nasdaq

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 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 such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer" "smaller reporting company," 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	☐		

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

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. ☐

The aggregate market value of the shares of Common Stock held by non-affiliates of the registrant was approximately $2,998.5 million as of June 30, 2019. For purposes of this computation, shares held by affiliates and by directors and officers of the registrant have been excluded.

As of February 7, 2020 there were 194,642,610 shares of the registrant's Common Stock outstanding.

Documents Incorporated by Reference

Portions of the registrant's Proxy Statement for the 2020 Annual Meeting of Stockholders are incorporated by reference in Part III hereof.

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PART I

Unless the context otherwise requires, references to “CommScope Holding Company, Inc.,” “CommScope,” “the Company,” “Registrant,” “we,” “us,” or “our” are to CommScope Holding Company, Inc. and its direct and indirect subsidiaries on a consolidated basis.

This Annual Report on Form 10-K includes certain statements that constitute “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which reflect our current views with respect to future events and financial performance. These forward-looking statements are generally identified by their use of such terms and phrases as “intend,” “goal,” “estimate,” “expect,” “project,” “projections,” “plans,” “anticipate,” “should,” “could,” “designed to,” “foreseeable future,” “believe,” “think,” “scheduled,” “outlook,” “target,” “guidance” and similar expressions, although not all forward-looking statements contain such terms. This list of indicative terms and phrases is not intended to be all-inclusive. Readers are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date the statement was made.

These statements are subject to various risks and uncertainties, many of which are outside our control. Item 1A, “Risk Factors,” of this Annual Report on Form 10-K sets forth more detailed information about the factors that may cause our actual results to differ, perhaps materially, from the views stated in such forward-looking statements. Although the information contained in this Annual Report on Form 10-K represents our best judgment as of the date of this report based on information currently available and reasonable assumptions, we can give no assurance that the expectations will be attained or that any deviation will not be material. Given these uncertainties, we caution you not to place undue reliance on these forward-looking statements, which speak only as of the date made. We are not undertaking any duty or obligation to update any forward-looking statements to reflect developments or information obtained after the date of this Annual Report on Form 10-K, except to the extent required by law.

ITEM 1. BUSINESS

Company Overview

CommScope Holding Company, Inc. was incorporated in Delaware on October 22, 2010. We are a global provider of infrastructure solutions for communication and entertainment networks. Our solutions for wired and wireless networks enable service providers including cable, telephone and digital broadcast satellite operators and media programmers to deliver media, voice, Internet Protocol (IP) data services and Wi-Fi to their subscribers and allow enterprises to experience constant wireless and wired connectivity across complex and varied networking environments. Our solutions are complemented by a broad array of services including technical support, systems design and integration. We are a leader in digital video and IP television distribution systems, broadband access infrastructure platforms and equipment that delivers data and voice networks to homes. Our global leadership position is built upon innovative technology, broad solution offerings, high-quality and cost-effective customer solutions, and global manufacturing and distribution scale.

We have a team of approximately 30,000 people to serve our customers in over 150 countries through a network of world-class manufacturing and distribution facilities strategically located around the globe. Our customers include substantially all the leading global telecommunication operators, data center managers, leading multi-system operators (MSOs) and thousands of enterprise customers, including many Fortune 500 companies. We have long-standing, direct relationships with our customers and serve them through a direct sales force and a global network of channel partners.

On April 4, 2019, we completed the acquisition of ARRIS International plc (ARRIS) (the Acquisition) in an all-cash transaction with a total purchase price of approximately $7.7 billion, including debt assumed. The combined company is expected to drive profitable growth in new markets, shape the future of wired and wireless communications, and be in a position to benefit from key industry trends, including network convergence, fiber and mobility everywhere, 5G, Internet of Things (IoT) and rapidly changing network and technology architectures. The operations of ARRIS are included in our consolidated operating results for the year ended December 31, 2019 from the date of the Acquisition, April 4, 2019.

For the year ended December 31, 2019, our revenues were $8.35 billion and our net loss was $929.5 million, which included goodwill impairment charges of $376.1 million, acquisition accounting adjustments of $264.2 million and transaction and integration costs of $195.3 million. For further discussion of our current and prior year financial results, see Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the Consolidated Financial Statements included in Part II, Item 8 of this Annual Report on Form 10-K.

Operating Segments

Prior to the Acquisition, we operated and reported based on two operating segments: Connectivity Solutions (Connectivity) and Mobility Solutions (Mobility). Subsequent to the acquisition of ARRIS, we reported financial performance based on five operating segments: Connectivity, Mobility, Customer Premises Equipment (CPE), Network & Cloud (N&C) and Ruckus Networks (Ruckus).

The distribution of net revenues between our five segments is as follows:

	Year Ended December 31,		
	2019	2018	2017
Connectivity	30.6%	61.6%	61.6%
Mobility	21.0	38.4	38.4
CPE	30.4	—	—
N&C	12.9	—	—
Ruckus	5.0	—	—
Total	100.0%	100.0%	100.0%

In the discussion below regarding our CPE, N&C and Ruckus segments, 2019 full year net sales represent net sales for the segments including the period before the Acquisition, January 1, 2019 – April 3, 2019, which is not included in our reported consolidated results.

Connectivity Solutions Segment (2019 Net Sales of $2.6 billion)

Our Connectivity segment provides innovative fiber optic and copper cable and connectivity solutions for use in data centers, business enterprises, telecommunications, cable television and residential broadband networks. Our Connectivity portfolio includes innovative solutions for both indoor and outdoor network applications.

Our indoor connectivity solutions are sold primarily under the SYSTIMAX, NETCONNECT and Uniprise brands and include optical fiber and twisted pair structured cable solutions, intelligent infrastructure management hardware and software and network rack and cabinet enclosures to create physical layer solutions that enable voice, video and data communication and building automation.

Our outdoor connectivity solutions are used in both local-area and wide area networks and “last-mile” fiber-to-the-home installations, including deployments of fiber-to-the-node, fiber-to-the-premises and fiber-to-the-distribution point to homes, businesses and cell sites. These products primarily comprise hardened connector systems, fiber distribution hubs and management systems, couplers and splitters, plug-and-play multiport service terminals, hardened optical terminating enclosures, high density cable assemblies and splice closures.

Mobility Solutions Segment (2019 Net Sales of $1.8 billion)

The Mobility segment provides the integral building blocks for cellular base station sites and related connectivity; indoor, small cell and distributed antenna wireless systems; and wireless network backhaul planning and optimization products and services. Our macro cell site solutions can be found at wireless tower sites and on rooftops. Our metro cell solutions can be found on street poles and on other urban structures. Macro and metro cell site applications represent approximately 85% of our Mobility segment net sales. Our distributed antenna system (DAS) and small cell solutions allow wireless operators to increase spectral efficiency and enhance cellular coverage and capacity in challenging network conditions such as commercial buildings, urban areas, stadiums and transportation systems.

Our solutions, marketed primarily under the Andrew brand, enable wireless operators to meet coverage and capacity requirements for next-generation networks. We focus on physical-layer solutions for all aspects of the radio access network from the macro through the metro, to the indoor layer. We believe our macro cell site, metro cell site, DAS and small cell solutions establish us as a global leader in RF infrastructure solutions for wireless operators and original equipment manufacturers (OEMs). We strive to provide a one-stop source for managing the technology lifecycle of a wireless network, including complete physical layer infrastructure solutions for 3G, 4G and 5G applications.

Customer Premises Equipment Segment (2019 post-Acquisition Net Sales of $2.5 billion and 2019 full year Net Sales of $3.4 billion)

The CPE segment includes subscriber-based solutions that support broadband and video applications connecting cable, telecommunications and satellite service providers to a customer’s home and adds wireless connectivity or other wired connections integrating in-home devices together to enable the consumption of internet-based services and the delivery of broadcast, streamed and stored video to televisions and other connected devices. Broadband offerings include devices that provide residential connectivity to a service provider’s network, such as digital subscriber line (DSL) and cable modems and telephony and data gateways which incorporate routing and Wi-Fi functionality. Video offerings include set top boxes that support cable, satellite and IPTV content delivery and include products such as digital video recorders (DVRs), high definition set top boxes and hybrid set top devices.

Network & Cloud Segment (2019 post-Acquisition Net Sales of $1.1 billion and 2019 full year Net Sales of $1.5 billion)

Our N&C segment’s product solutions include cable modem termination systems, video infrastructure, distribution and transmission equipment and cloud solutions that enable facility-based service providers to construct a state-of-the-art residential and metro distribution network. The portfolio also includes a full suite of global services that offer technical support, professional services and system integration to enable solutions sales of our end-to-end product portfolio.

Ruckus Networks Segment (2019 post-Acquisition Net Sales of $0.4 billion and 2019 full year Net Sales of $0.6 billion)

Our Ruckus segment provides converged wired (local area network (LAN)) and wireless (WLAN) networks for enterprises and service providers. Product offerings include indoor and outdoor Wi-Fi and LTE access points, access and aggregation switches; an IoT suite, on-premises and cloud-based control and management systems; and software and software-as-a-service (SaaS) applications addressing security, location, reporting and analytics.

Industry Background

We participate in the large and growing global market for connectivity and essential communications infrastructure. This market is being driven by the growth in bandwidth demand associated with the continued demand of smartphones, tablets and machine-to-machine (M2M) communication as well as the proliferation of data centers, Big Data, cloud-based services, streaming media content and IoT. In addition, video distribution over the broadband IP network is transforming how content is managed and consumed. IP facilitates new forms of video such as Over-the-Top (OTT) and interactive television. Specifically, we serve the following markets within the connectivity and communications infrastructure industry:

Enterprise Market – We offer equipment to provide licensed and unlicensed, wired and wireless, public and private indoor networks. This equipment includes Wi-Fi, DAS, stand-alone and distributed small cells, switching, fiber and twisted pair cabling and apparatus products for enterprise owned, third-party owned and carrier owned networks.

Outdoor Wireless Market – We deliver macro-cell tower antennas, metro-cell antennas, cabling, poles, power systems and other equipment to enable outdoor cellular coverage in rural, suburban and metro areas.

In-Home Networks Market – We sell gateways, modems, Wi-Fi access points (APs), Wi-Fi mesh extenders and set-top boxes that are deployed inside homes to connect end-users and devices to cable television, OTT content and the internet.

Broadband Access Market – We offer passive and active equipment, including cabling, connectivity, closures, cabinets, splitters and other passive equipment for television, internet and cellular backhaul networks. In cable networks we provide active equipment such as converged cable access platform (CCAP) hardware and software as well as network plant equipment which includes optical nodes and amplifiers. In fiber networks we provide the hardware and software components for gigabit-capable passive optical networks (GPON).

Data Center Market – We provide cabling, connectivity and other equipment for multi-tenant, enterprise and hyperscale data centers.

Video Systems & Security Market – We sell equipment to encode, encrypt, package and distribute video content for secure delivery over the network.

Network Services Market – We provide our customers with services focused on planning, deploying and maintaining their communications networks.

The table below outlines how our segments address the primary markets we serve.

Market	**Connectivity**	**Mobility**	**CPE**	**N&C**	**Ruckus**
Enterprise	✓	✓			✓
Outdoor Wireless		✓			
In-Home Networks			✓		
Broadband Access	✓		✓	✓	
Data Centers	✓			✓	
Video Systems & Security				✓	
Network Systems		✓		✓	

There are several major trends that we expect to drive network deployments and investment, including:

Evolving Network Architecture and Technology

The pace of change in networking has increased as consumers and data-driven businesses utilize more bandwidth and shift toward cloud and mobile applications. Exponential growth in video and mobile data consumption are revolutionizing how we connect to each other and changing the network architecture needed to support consumer demand. This trend requires better network coverage, greater broadband access, and increased capacity and data storage.

Our customers are working to transition their networks to become faster, more responsive and more efficient. CommScope sees several key network trends that will continue to impact CommScope and the industry during 2020 and beyond:

1) ***Network Convergence***: Operators are moving toward converged or multi-use network architectures. Rather than building upon independent wireline and wireless networks, operators are now shifting toward networks that combine voice, video and data communications into a single converged data network for wired and wireless services.

2) ***Continued Disruption by Over-the-Top TV:*** Although content consumption continues to increase, subscriptions to pay TV are declining. As a result, cable operators are compelled to invest in and upgrade their networks and expand their video, voice, data and mobile services to deliver higher data rates in both the uplink and downlink on their network. While past data trends have been defined by rapid growth in the downlink, IoT will drive the need for major network change in the uplink.

3) ***Densification*****:** As wireless operators work to meet consumer demand, cell splitting, in the form of densification is expected to be a key driver for fulfilling the promise of 5G networks. Increased sectorization at macro cell sites and establishing better inbuilding coverage will also play significant roles in the 5G network. We expect that densification will require significant fiber cable and connectivity between wireless cell sites.

4) ***Virtualization, Centralization and Disaggregation:*** Operators are virtualizing and centralizing their networks to make them more flexible and efficient. Wireless operators are deploying centralized radio access networks (CRAN) as a first step in the evolution to a virtualized radio access network. Eventually this will enable servers and switches to replace some of the hardware specific equipment that exists today and allow much of the processing to be performed on general purpose processors wherever and whenever it is needed throughout the network. Cable operators are also seeking to virtualize their networks by moving from a traditional CCAP architecture to a distributed access architecture (DAA). This moves some of the processing from the head end to the node and virtualizes the rest on traditional switches and servers.

Transition to 5G

5G wireless is evolving from an industry vision toward a tangible, next generation wireless technology. Many operators have begun a transition to 5G networks and have announced trials and pre-standard deployments of 5G technology. The number of 5G-enabled devices is expected to continue to increase during 2020. The primary benefits of 5G are expected to include:

- Enhanced mobile broadband—to support significant improvement in data rates and user experience in both the uplink and downlink,
- IoT communications to support the expected billions of connections between machines as well as short bursts of information to other systems, and
- Low latency, high-reliability—to support applications that are critical or are needed in real time, like factory machines, virtual reality and augmentation.

Wireless operators will need to both acquire and launch new spectrum for 5G, as well as continue their strategy of re-allocation of spectrum from one generation to another. Some of this spectrum will be at much higher frequencies and will use new technologies to deliver exceptional amounts of bandwidth to subscribers. 5G also requires significant fiber infrastructure to connect wireless access points to each other to improve the response time of the network. As wireless operators transition toward 5G, they must also manage the fundamental network deployment issues of site acquisition, power, backhaul and in-building wireless proliferation.

In addition to investment required by wireless operators, the transition to 5G could also spark an investment cycle by cable operators as they upgrade their networks to compete with fixed wireless broadband, which could become a viable alternative to traditional broadband internet access.

Fiber Deep Deployments

Residential and business bandwidth consumption continues to grow substantially. The proliferation of OTT video, multiscreen viewing, cloud services and social media are prompting operators to accelerate fiber deployment. Operators can increase network capacity by installing fiber deeper into their networks. Although consumer devices are increasingly connected to the network via a wireless connection such as LTE or Wi-Fi, these wireless access points must have abundant backhaul capacity available to provide consumers the experience they expect. Operators around the globe are deploying fiber deep to build next generation networks. These networks use the capabilities of fiber to enable consumers access to content at higher speeds with improved network response time.

As networks improve and deliver higher speed and greater reliability, many operators are choosing to provide both residential and business services over a common physical layer infrastructure, saving them time and money. In addition, with the deployments of metro cells, outdoor small cells and fixed wireless broadband to the home, these same service providers are planning to utilize this common physical layer infrastructure to provide connectivity to these wireless access points.

Shift in Enterprise Spending

Several trends in the enterprise market are expected to create opportunities and challenges. First, the shift toward mobility in business enterprises is expected to impact the amount and type of structured copper connectivity needed over the longer-term. As the bandwidth requirements for Wi-Fi, indoor cellular networks (private and public), and IoT devices increase, more access points will be needed throughout commercial buildings. As a result, enterprises are expected to adjust in-building cabling designs to deliver both power and high-speed data to those devices. Power-over-ethernet is expected to become increasingly important as the number of devices used for Wi-Fi and indoor cellular networks multiplies. While enterprises continue to need copper connectivity to power edge devices, enterprises are deploying fiber more extensively in data centers. Over the next several years, we expect the growing demand for fiber and Wi-Fi solutions to result in decelerating demand for copper solutions in networks.

Due to huge increases in data traffic and migration of applications to the cloud, enterprises are also shifting spending toward multi-tenant (co-located) data centers and hyperscale cloud service providers, which offer cloud data center services as a replacement for in-house corporate data centers. Multi-tenant and hyperscale data center managers are focused on ultra-low loss, high density, scalable fiber connectivity solutions.

Enterprises are also looking at using LTE and 5G for their own, private uses. It is expected that private networks will become far more important to an enterprise’s information technology plans and will provide a level of reliable connection that they have not been able to get from their Wi-Fi networks, further moving the demand of enterprise communications into the wireless domain.

Metro Cell, DAS and Small Cell Investment to Enhance and Expand Wireless Coverage and Capacity

As demand growth continues to outpace macro cell capacity growth, new solutions are required for densely populated areas. Metro cells and indoor networks have emerged as important layers of the network. Metro cells are smaller outdoor cell sites, located closer to the ground, having a lower power level than traditional macro cell sites. Metro cells blend into their environment and are often found integrated with traditional street furniture, which helps alleviate zoning restrictions that have made traditional deployments difficult.

Small cell and DAS solutions address the capacity and speed requirements from an indoor perspective. These systems provide coverage and capacity to the indoor environment and reduce the load from the macro and metro layers, which improves overall network performance. Small cell and DAS systems may range from small single operator, single-band, low-capacity systems for use in enterprise buildings to large multi-carrier, multi-technology, multi-band systems for use in high capacity public venues.

Transition to Wi-Fi 6

Wi-Fi 6 is the next generation standard in Wi-Fi technology that builds on and improves the current Wi-Fi standard. Until this point, all upgrades to Wi-Fi have been less than a gigabit, but Wi-Fi 6 breaks through this boundary and will likely drive the upgrade of not only the access point but also the switch and cabling systems. Moreover, regulatory efforts are underway to free up the necessary spectrum in the 6GHz band which will enable many more use cases and, in combination with Wi-Fi 6, untether a whole host of equipment.

Strategy

With the global rise in demand for consumer, business and device connectivity, we expect the need and reliance on communications networks to increase dramatically over the next ten years. Our strategy and 2020 priorities are to:

Realign Our Business Structure

To support our goal of shaping the most advanced networks of the future, we announced a realignment of our operating structure that became effective in January 2020. Based on this new operating structure, our new segments are Venue and Campus Networks, Broadband Networks, Outdoor Wireless Networks and Home Networks. We will begin reporting based on these segments in the first quarter of 2020. We are positioned as a leader in each of these areas already and will endeavor to defend our leadership in the more mature parts of these markets, while also shifting resources towards our targeted growth choices within them. We believe this realignment will not only improve the execution of our strategy and help unlock the full potential of our end-to-end portfolio of networking equipment, but it will also help us take advantage of greater revenue and cost synergy potential within our current businesses to achieve the following:

- Further improve our market leadership positions;
- Accelerate an integrated technology roadmap and position us to respond more quickly to new market opportunities;
- Allow us to create a unified supply chain organization to optimize our global manufacturing and distribution footprint and better position us to respond quickly to rapidly changing market conditions; and
- Position us to take advantage of our leadership position in fast growing, strategic markets.

In the discussion below, 2019 full year net sales represent net sales for the segments including the period before the Acquisition, January 1, 2019 – April 3, 2019, which is not included in our reported consolidated results.

Venue and Campus Networks - Targeting both public and private networks for campuses, venues, data centers, and buildings, this segment includes our Ruckus Networks, Enterprise and Distributed Coverage and Capacity Systems (DCCS) businesses. It includes Wi-Fi and switching, DAS, licensed and unlicensed small cells, and enterprise fiber and copper infrastructure. With 2019 full year net sales of approximately $2.1 billion, this segment has several product lines that are expected to grow rapidly and can provide a differentiated, integrated offering.

Broadband Networks - This segment, which combines our Network Cable and Connectivity and Network & Cloud businesses, will position CommScope as the leading North American access network equipment manufacturer with an end-to-end product portfolio serving the telco and cable provider broadband market. 2019 full year net sales for the new Broadband segment were approximately $2.8 billion.

Outdoor Wireless Networks - This segment brings together our RF Products and Integrated Solutions businesses, which represent 2019 full year net sales of approximately $1.5 billion. The Outdoor Wireless segment will focus on the macro and metro cell businesses. It consists of base station antennas, RF filters, tower connectivity, microwave antennas, metro cell and cabinets/steel, accessories and spectrum access system (SAS). As our wireless operator customers shift a portion of their 5G capital expenditures from the macro tower to the metro cell, CommScope’s differentiated offerings and portfolio can support a smooth and cost-effective transition for customers.

Home Networks - Comprising the former Consumer Premises Equipment business, this segment, which represents 2019 full year net sales of approximately $3.4 billion, will focus on the future of the connected home and devices inside the home. Anchored by CommScope’s broadband gateways (coaxial, fiber and wireless), video set-tops and in-home devices, this business continues to provide the industry-leading technologies for providing broadband services to and inside the home.

Over the next five years, we expect to transform our organization into one that has better operational speed and resilience and can better service our existing customers, as well as new ones. One of the ways we can do this is to embrace the digital revolution and embrace the move to cloud-based software solutions both in our products and in our operations. We believe that by combining the strengths of our various products, services and technical capabilities, we can create more valued solutions that help our customers achieve better business outcomes and lower the overall cost per bit of communications networks, while making them more symmetrical and responsive at the same time.

Focus on Innovation to Solve Critical Problems

We plan to build on our legacy of innovation and on our worldwide portfolio of patents and patent applications by continuing to invest in research and development (R&D). We intend to drive profitable growth by enabling our service provider, enterprise, hyperscale and emerging cloud customers with the necessary broadband capacity to meet increased consumer demand. We also intend to utilize our deep industry expertise to offer unique perspectives to solve customers' challenges. We intend to focus our investment on high-growth markets.

Enhance Sales Growth

We intend to generate growth opportunities by:

- offering existing products and solutions into new geographic markets;
- collaborating with the world's leading service and content providers and maintaining deep industry relationships;
- cross-selling our offerings into new markets; and
- building new integrated product offerings for existing and new use cases.

Become a Preferred Partner to our Customers

We plan to expand our industry leadership positions by developing and enhancing value-creating partner relationships with our customers, suppliers and distributors, as well as our channel and technology partners. We intend to expand these relationships by innovating, collaborating and selling with our customers. We expect to meet our commitments and maintain our product quality while collaborating with our customers to ensure we are providing solutions to their key network challenges.

Continue to Enhance Operational Efficiency and Cash Flow Generation

We continuously pursue strategic initiatives aimed at optimizing our utilization of resources by reducing manufacturing and distribution costs and optimizing our overall cost structure. We believe that we have a strong track record of improving operational efficiency and successfully executing on formalized annual profit improvement plans, cost-savings initiatives and working capital improvements to drive future profitability and cash flow. Related to the acquisition of ARRIS, we are on track to deliver at least $75 million in cost synergies in the first year post close and we expect to exceed our target annual run-rate savings of $150 million ahead of the third anniversary of the close of the ARRIS transaction. These synergies are being driven by the elimination of redundancies, including within logistics and SG&A; leveraging global shared services; consolidation of our real estate footprint; and consolidation in procurement, including supply-chain related savings associated with consolidation of spend. We believe we will be able to increase overall cash flow from operations and we intend to use cash we generate to reduce our indebtedness and eventually return to making strategic acquisitions.

Customers

Our customers include substantially all the leading global telecommunications operators, data center managers, leading cable television, telecommunication and satellite multi-channel video service providers and MSOs, thousands of enterprise customers, including many Fortune 500 companies, and end customers in hospitality, venues, education, government and smart cities, which we serve both directly and indirectly. Major customers and distributors include companies such as America Movil, S.A.B. de C.V.; Anixter International Inc. (Anixter); AT&T Inc.; Charter Communications, Inc.; Comcast Corporation (Comcast); Cox Communications, Inc.; KGP Co.; Liberty Communications; Shaw Communications, Inc.; and Verizon Communications Inc. For the year ended December 31, 2019, after giving effect to the Acquisition as if it happened on January 1, 2019, we would have derived approximately 21% of our consolidated net sales from our top two direct customers. Our largest customer would have been Comcast, accounting for 13% of our consolidated net sales, after giving effect to the Acquisition. Sales to Comcast are derived from our Connectivity, N&C and CPE segments. Net sales to Anixter accounted for 11% of our actual consolidated net sales for the years ended December 31, 2018 and 2017. Net sales to Anixter primarily originate in the Connectivity segment.

Products from our Connectivity segment are primarily sold through independent distributors or system integrators for large telecommunications operators. We also sell directly to cable television system operators, broadband operators and service providers that deploy broadband networks.

Products from our Mobility segment are primarily sold directly to wireless operators, OEMs that sell equipment to wireless operators and other service providers that deploy elements of wireless networks at the direction of wireless operators. Our customer service and engineering groups maintain close working relationships with these customers due to the significant amount of customization associated with some of these products. Although we sell to most wireless operators globally, we are dependent on a small number of large operators.

Products from our CPE segment are primarily sold directly to wireline network service providers, such as telephone companies and cable television network providers, to be deployed by them into their subscribers' homes and businesses. We sell some products to satellite video distributors who also deploy our products into their subscribers' premises as well. In some cases, we sell through specialized resellers and distributors who primarily provide logistics support and, in certain circumstances, post-sale service and support. Our customer service and engineering groups maintain close working relationships with these customers due to the significant amount of customization associated with some of these products. We sell these products to most of the wireline and satellite operators globally. In the United States (U.S.), we also sell certain products directly to consumers over the internet and through brick and mortar retailers.

Products from our N&C segment are primarily sold directly to wireline network service providers, such as telephone companies and cable television network providers, to be deployed by them into their service delivery networks. In some cases, we sell through specialized resellers and distributors who primarily provide logistics support and in certain circumstances post-sale service and support. Our customer service and engineering groups maintain close working relationships with these customers due to the significant amount of customization associated with some of these products. We sell these products to most of the wireline and satellite operators globally.

Products from our Ruckus segment are primarily sold to customers in a broad range of enterprise vertical markets, including hospitality, education, smart cities, government, venues and service providers indirectly through a large network of value-added resellers and distributors, which we collectively refer to as channel partners. Our channel partners provide lead generation, pre-sale support, product fulfillment and, in certain circumstances, post-sale customer service and support. In some instances, service providers may also act as a channel partner for sales of our solutions to enterprises. In certain circumstances, we do sell Ruckus segment products directly to end customers, but it is a relatively small part of the overall business.

We generally have no minimum purchase commitments from any of our distributors, system integrators, value-added resellers, wireless operators or OEM customers, and our contracts with these parties generally do not prohibit them from purchasing from our competitors or offering products or services that compete with ours. Although we maintain long-term relationships with these parties and have not historically lost key customers, we have experienced significant variability in the level of purchases by our key customers. Any significant reduction in sales to these customers, including as a result of the inability or unwillingness of these customers to continue purchasing our products, could materially and adversely affect our business, financial condition, results of operations and cash flows. See Part 1, Item 1A, "Risk Factors."

Competition

The markets in which we participate are dynamic and highly competitive, requiring companies to react quickly to capitalize on opportunity. We retain skilled and experienced personnel and deploy substantial resources to meet the changing demands of the industry and to capitalize on change. We compete with global and regional manufacturers, distributors and wholesalers, including companies that are larger than we are. The market for our products is highly competitive and subject to rapid technological change. We encounter significant domestic and international competition across all segments of our business.

Our competitors include large, diversified companies — some of whom have substantially more assets and greater financial resources than we do. We also face competition from small to medium-sized companies and less diversified companies that have concentrated efforts in one or more areas of the markets we serve. Our major competitors include Advanced Digital Broadcast (ADB) S.A.; America Fujikura Ltd. (AFL) (a subsidiary of Fujikura, Ltd.,); Amphenol Corporation; Arcadyan Technology Corporation; Arista Networks, Inc.; ASUSTek Computer Inc. (Asus); ATX Networks Corporation; Belden Inc.; Belkin International, Inc.; Berk-Tek (a Company of Nexans S.A.); Calix, Inc.; Casa Systems Co.; Ciena Corporation; Cisco Systems, Inc.; Comba Telecom Systems Holding Ltd.; Corning Incorporated; Electroline Equipment, Inc.; Emcore Corporation; Emerson Electric Co.; Extreme Networks, Inc.; FiberHome Networks; Finisar Corporation; Genexis B.V.; Guavus, Inc. (a Thales Company); H3C Technologies Co., Ltd.; Harmonic, Inc.; Hewlett Packard Enterprise Development LP; Hitron Technologies Inc.; Hong Kong Skyworth Digital Holdings Co.; Huawei Technologies Co., Ltd.; Huber + Suhner BKTel GmbH; Humax Co., Ltd.; Imagine Communications Corp.; Infinera Corporation; International Business Machines (IBM) Corporation; JMA Wireless B.VV; Lindsay Broadband Inc.; Netgear Inc.; Netgem; NetScout Systems, Inc.; Nokia Corporation; Ortronics, Inc. (a brand of Legrand NA, LLC); Pacific Broadband Networks; Panduit Corp.; PCT International, Inc.; Radio Frequency Systems (RFS) Holding GmbH (a subsidiary of Nokia Corp); Sagemcom Broadband SAS; Samsung Electronics Co., Ltd.; SeaChange International, Inc.; SMC Networks, Inc.; SOLiD Gear, Inc.; Sumavision Technologies Co., Ltd.; Sumitomo Corp; Technetix; Technicolor S.A.; Telefonaktiebolaget LM Ericsson; Teleste Corporation; TiVo Corporation; TOA Technologies (Oracle); Ubee Interactive Corporation; Ubiquiti, Inc.; Vecima Networks, Inc.; Vector Networks; Veramatrix, Inc.; Wisi Communications; and ZTE Corporation.

We compete primarily on the basis of delivering solutions, product specifications, quality, price, customer service and delivery time. We believe that we differentiate ourselves in many of our markets based on our market leadership, global sales channels, intellectual property, strong reputation with our customer base, the scope of our product offering, the quality and performance of our solutions, and our service and technical support.

Competitive Strengths

We are a global leader in connectivity and essential infrastructure solutions for communications and entertainment networks, and we believe we hold leading market positions in our segments. Since our founding in 1976, CommScope has been a leading brand in connectivity solutions for communications networks. In the cable television and video network equipment industry, both CommScope and ARRIS are longstanding market leaders, along with other brands we own such as Ruckus, Pace, Motorola Home, ADC and many smaller brands. In the wireless industry, Andrew is one of the world's most recognized brands and a global leader in RF solutions for wireless networks. In the enterprise market, SYSTIMAX, NETCONNECT and Uniprise are recognized as global market leaders in enterprise connectivity solutions for business enterprise and data center applications.

We believe the following competitive strengths have been instrumental to our success and position us well for future growth and strong financial performance:

Differentiated Solutions Supported by Ongoing Innovation and Significant Proprietary Intellectual Property (IP)

Our integrated solutions for building better networks are differentiated in the marketplace and are a significant global competitive advantage. We help our customers achieve better business outcomes, and serve their customers, employees, and shareholders. We invested $578.5 million in research and development during 2019 and $725.0 million, after giving effect to the Acquisition as if it happened on January 1, 2019, to advance product innovation and drive total cost of deployment and ownership down. Our ongoing innovation, supported by proprietary intellectual property and technology know-how, has allowed us to build and sustain a competitive advantage.

Established Sales Channels and Customer Relationships

We serve customers in over 150 countries and have become a trusted advisor to many of them through our industry expertise, quality products, leading technology and long-term relationships. These factors enable us to provide mission-critical connectivity solutions that our customers need to build and maintain high-performing communication networks. Our customers include substantially all the leading global telecommunications operators, data center managers, cable television providers or MSOs and thousands of enterprise customers, including many Fortune 500 companies. We are a key supplier within the wireless infrastructure market and enjoy established sales channels across all geographies and technologies. Our long-standing relationships with telecommunication operators enable us to work closely with them in providing highly customized solutions aligned with their technology roadmaps. We have a global sales force with sales representatives based in North America, Europe, Latin America, Asia and other regions, and an extensive global network of channel partners, including independent distributors, system integrators and value-added resellers. Our sales force has direct relationships with our customers and end users which generates demand for our products, with a significant portion of our sales fulfilled through channel partners. Our direct sales force and channel partner relationships give us extensive reach and distribution capabilities to customers globally.

Global Scale, Manufacturing Footprint and Quality

Our global manufacturing and distribution footprint and worldwide sales force give us significant scale within our addressable markets. We believe our scale, stability and quality make us an attractive strategic partner to our large global customers, and we have been repeatedly recognized by key customers for these attributes. In addition, our ability to leverage our core competencies across our business, coupled with our successful track record of operational efficiencies, has allowed us to improve our margins and cash flows over time while continuing to invest in research and development and acquisitions targeting new products and markets.

Our manufacturing and distribution facilities are strategically located to optimize service levels and product delivery times. We also utilize lower-cost geographies for high labor content products and largely automated plants in higher cost regions. Over half of our manufacturing employees are in lower-cost geographies such as Mexico, China, India and the Czech Republic. The combination of our dynamic manufacturing organization, our global network of third party manufacturers and our distribution organization allows us to:

- Flex our capacity to meet market demand and expand our market position;
- Deliver high-quality customer solutions;
- Provide high customer service levels due to proximity to the customer; and
- Effectively integrate acquisitions and capitalize on related synergies.

Proven Management Team with Record of Operational Excellence and Successful Mergers and Acquisition Integration

We have a strong track record of organically growing market share, establishing leadership positions in new markets, managing cash flows, delivering profitable growth across multiple economic cycles and integrating large and small acquisitions. Our senior management team has extensive experience in connectivity solutions for the communications infrastructure industry.

We have a history of strong operating cash flow and have generated over $1.6 billion in cumulative operating cash flow over the last three years. Our strong cash flow profile has allowed us to pay down debt, while also continuing to invest in research and development aimed at both driving profit expansion and revenue growth. We continuously pursue strategic initiatives aimed at optimizing our resources, reducing manufacturing and distribution costs and lowering our overall cost structure.

Throughout our history, we have successfully complemented our organic growth with strategic acquisitions. We are ahead of plan on our commitment around the ARRIS synergy capture. We completed the Broadband Network Systems (BNS) business integration and delivered substantial synergies while also completing significant system integrations and re-organizing the business. Our management team has effectively integrated other large acquisitions, such as Andrew Corporation in 2007 and Avaya Connectivity Solutions in 2004. We have also executed tuck-in acquisitions, such as Cable Exchange, Airvana, Argus and Alifabs, to help expand our market opportunities and continue to solve our customers' business challenges in multiple growth areas.

Manufacturing and Distribution

We maintain a balance of internal and external manufacturing providers to continue offering our customers a competitive combination of quality, cost and flexibility in meeting their needs. We develop, design, fabricate, manufacture and assemble many of our products and solutions in-house at our facilities located around the world. We have strategically located our manufacturing and distribution facilities to provide superior service levels to customers. We utilize lower-cost geographies for high labor content products while investing in largely automated plants in higher-cost regions close to customers. Most of our manufacturing employees are located in lower-cost geographies such as Mexico, China, India and the Czech Republic.

In addition, we utilize contract manufacturers located throughout the world, including in Brazil, China, Malaysia, Mexico, South Africa, Thailand, Vietnam and the U.S., for many of our product groups, including our broadband and video products, certain Network and Cloud products, certain cabinets and filter products and all of our Ruckus segment products. Our global footprint allows us to hedge against macroeconomic headwinds in an everchanging environment.

We continuously evaluate and adjust operations to improve service, lower cost and improve the return on our capital investments, and we expect to continue modifying our global operations to adapt to changing product demand and business conditions.

Raw Materials and Components

Our products are manufactured or assembled from both standard components and parts that are unique to our specifications. Our internal manufacturing operations are largely process oriented and we use significant quantities of various raw materials, including aluminum, bimetals, brass, copper, plastics and other polymers, optical fiber and steel, among others. We use significant volumes of copper, aluminum, steel and polymers in manufacturing coaxial and twisted pair cables and antennas. Other parts are produced using processes such as stamping, machining, molding and pressing from metals or plastics. Portions of the requirements for these materials are purchased under supply arrangements where some portion of the unit pricing may be indexed to commodity market prices for these metals. We may occasionally enter forward purchase commitments or otherwise secure availability for specific commodities to mitigate our exposure to price changes for a portion of our anticipated purchases. Certain of the raw materials utilized in our products may only be available from a few suppliers, and we may enter into longer term agreements to secure access to certain key inputs. We may, therefore, encounter availability issues and/or significant price increases.

Our profitability may be materially affected by changes in the market price of our raw materials, most of which are linked to the commodity markets. Prices for aluminum, copper, plastics and certain other polymers derived from oil and natural gas have fluctuated substantially during the past several years. We have adjusted our prices for certain products and may have to adjust prices again. Delays in implementing price increases, failure to achieve market acceptance of price increases, or price reductions in response to a rapid decline in raw material costs, could have a material adverse impact on the results of our operations.

In addition, some of our products are assembled from specialized components and subassemblies manufactured by third-party suppliers. We depend upon sole suppliers for certain of these components, including memory and chip capacitors. If these sources cannot provide these components in sufficient quantity and quality on a timely and cost-efficient basis, it could materially impact our results of operations until another qualified supplier is found. We believe that our supply contracts and our supplier contingency plans mitigate some of this risk. Our supply agreements include technology licensing and component purchase contracts. Several of our competitors have similar supply agreements for these components. In addition, we license software for operating network and security systems or sub-systems and a variety of routing protocols from different suppliers.

Research and Development

We operate in an industry that is subject to rapid changes in technology, and our success is largely contingent upon anticipating and reacting to such changes. Accordingly, R&D is important to preserve and expand our position as a market leader and to provide the most technologically advanced solutions in the marketplace. We invested $578.5 million in research and development during 2019 and $725.0 million, after giving effect to the Acquisition as if it happened on January 1, 2019, and we expect to continue with substantial investments in future years. We intend to focus our major R&D activities on high-growth opportunities such as fiber optic connectivity for fiber-to-the-x (FTTX) and data centers, Wi-Fi 6 and 6GHz, CCAP, DAA, Data Over Cable Service Interface Specification (DOCSIS) 4.0, gigabit passive optical network (GPON), active and passive base-station antennas and metro cell and small cell wireless solutions. We are also developing solutions that support the convergence of wireline and wireless networks in preparation for 5G. Several of our professionals are leaders and active contributors in standards-setting organizations, which helps ensure that our products can be formulated to achieve broad market acceptance.

Backlog and Seasonality

At December 31, 2019 and 2018 we had an order backlog of $1,243.2 million and $500.0 million, respectively. Orders typically fluctuate from quarter to quarter based on customer demand and general business conditions. Our backlog includes only orders that are believed to be firm. Sometimes, unfilled orders may be canceled prior to shipment of goods, but cancellations historically have not been material. However, our current order backlog may not guarantee future demand.

Due to the variability of shipments under large contracts, customers’ seasonal installation considerations and variations in product mix and in profitability of individual orders, we can experience significant quarterly fluctuations in sales and operating income. Our operating performance is typically weaker during the first and fourth quarters and stronger during the second and third quarters. These variations are expected to continue in the future. It may be more meaningful to focus on annual rather than interim results.

Patents and Trademarks

We pursue an active policy of seeking intellectual property protection, including patents and registered trademarks, for new products and designs. For technology that is not owned by us, we have a program for obtaining appropriate licenses to ensure that we have the necessary license coverage for our products. In addition, we have formed strategic relationships with leading technology companies to provide us with early access to technology that we believe will help keep us at the forefront of our industry.

On a worldwide basis, we held approximately 15,000 patents and patent applications and approximately 3,000 registered trademarks and trademark applications. We consider our patents and trademarks to be valuable assets, and although no single patent is material to our overall operations, we believe the CommScope, Andrew, SYSTIMAX, HELIAX, NETCONNECT, ARRIS, SURFboard and Ruckus trade names and related trademarks are critical assets to our business. We intend to rely on our intellectual property rights, including our proprietary knowledge, trade secrets and continuing technological innovation, to develop and maintain our competitive position. From time to time there are disputes with respect to the ownership of the technology used in our industry and accusations of patent infringements. We will continue to protect our key intellectual property rights.

Corporate Responsibility and Sustainability

We believe that corporate responsibility and sustainability means making decisions that have a positive impact on our people, planet and bottom line. Our company-wide sustainability mission is to enable faster, smarter and more sustainable solutions while demonstrating the utmost respect for our human and natural resources. We are accomplishing this mission by utilizing innovative technology, intelligent engineering and energy efficient design to build more sustainable networks that make our customers more agile, while at the same time seeking to preserve the natural ecosystems from which we source our raw materials. While we may provide technological solutions, it is our people who make the real difference in our communities. Their commitment to our customers, fellow employees and the communities in which they live and work drives them to provide creative solutions, services and practices that are safe and sustainable for our environment and future generations.

We understand how important it is to consider the larger impact of our actions beyond the balance sheet. We are proud of CommScope’s significant standing in one of the world’s most vital and dynamic industries. We push ourselves and our thinking for the purpose of creating a better and sustainable tomorrow. For the sake of our current and future generations, we will continue to grow as a sustainable, environmentally conscious business that benefits the whole planet.

In 2019, we are particularly proud that we achieved our fourth consecutive Gold Corporate Social Responsibility (CSR) rating from EcoVadis, a global leader in monitoring, benchmarking and enabling sustainability in global supply chains. This places CommScope in the 98th percentile of all companies assessed by EcoVadis. For additional information, see our Corporate Responsibility & Sustainability pages on the CommScope website: https://www.commscope.com/About-Us/Corporate-Responsibility-and-Sustainability/.

ITEM 1A. RISK FACTORS

The following is a cautionary discussion of risks, uncertainties and assumptions that we believe are significant to our business. In addition to the factors discussed elsewhere in this Annual Report on Form 10-K, the following are some of the important factors that, individually or in the aggregate, we believe could make our results differ materially from those described in any forward-looking statements. It is impossible to predict or identify all such factors and, as a result, you should not consider the following factors to be a complete discussion of risks, uncertainties and assumptions related to us or our business.

ARRIS Acquisition (the Acquisition) Risks

The integration of CommScope and ARRIS International plc (ARRIS) will be costly and time-consuming and the anticipated benefits and cost savings may take longer to realize than expected or may not be realized at all. If we are unable to integrate ARRIS effectively, we may not realize the anticipated benefits of the Acquisition.

We are on track to deliver at least $75.0 million in cost synergies in the first year post close and we expect to exceed our target annual run-rate savings of $150.0 million ahead of the third anniversary of the close of the ARRIS transaction. We have incurred significant integration and restructuring costs and expect to incur more to achieve these synergies. These synergies are expected to come from all areas of our company, including sales, marketing, general and administrative, operations and R&D. Our ability to realize the anticipated benefits is dependent, to a large extent, on our ability to complete the integration of the two businesses. The combination of two independent businesses is a complex, costly and time-consuming process and there can be no assurance that we will be able to successfully integrate CommScope and ARRIS, or if such integration is successfully accomplished, that such integration will not be more costly or take longer than presently contemplated. If we cannot successfully complete the integration within a reasonable time frame, we may not be able to realize the anticipated benefits of the Acquisition, which could have a material adverse effect on our share price, business, financial position, results of operations and cash flows.

Our ability to realize the expected synergies and benefits of the Acquisition is subject to a number of risks and uncertainties, many of which are outside of our control. These risks and uncertainties include, among other things:

- the completion of an effective integration of operations, controls, policies and procedures, and technologies, as well as the harmonization of differences in the business cultures of CommScope and ARRIS;
- the diversion of management attention from ongoing operation of our business as well as ARRIS’ business during the integration;
- our ability to preserve customer, supplier and other important relationships of CommScope and ARRIS and resolve potential conflicts that may arise;
- the risk that ARRIS may have liabilities we failed to or were unable to discover in the course of performing due diligence;
- integrating CommScope’s and ARRIS’ various information systems, including different enterprise resource planning systems, will be complex and costly and may result in production disruptions or other operational challenges;
- the risk that integrating ARRIS’ workforce into the CommScope workforce may result in disruptions or be more costly than anticipated;
- greater than expected difficulties in achieving anticipated cost savings, synergies, business opportunities and growth prospects from the combination; and
- greater than expected difficulties in managing the expanded operations of a significantly larger and more complex combined business.

As a result of the Acquisition, The Carlyle Group (Carlyle) owns a substantial portion of our equity and its interests may not be aligned with yours.

Funding for the Acquisition included an investment by Carlyle in our Series A Convertible Preferred Stock. As a result, Carlyle owns approximately 16% of our common stock on an if-converted basis and we have increased the size of our board of directors to eleven, giving Carlyle the right to designate up to two directors. In addition, certain of our existing directors are senior advisors to Carlyle. Circumstances may occur in which the interests of Carlyle could conflict with the interests of our other stockholders. For example, the existence of Carlyle as a significant stockholder and Carlyle’s board appointment rights may have the effect of deterring hostile takeovers, delaying or preventing changes in control or changes in management or limiting the ability of our other stockholders to approve transactions that they may deem to be in the best interests of our company.

Competitive Risks

Our business is dependent on capital spending for data, communication and entertainment networks, and reductions in such capital spending could adversely affect our business.

Our performance is dependent on capital spending for constructing, rebuilding, maintaining or upgrading data, communication and entertainment networks, which can be volatile and difficult to forecast. Capital spending in the communications industry is cyclical and can be curtailed or deferred on short notice. A variety of factors affect the timing and amount of capital spending in the communications industry, including:

- competing technologies;
- general economic and market conditions;
- foreign currency fluctuations;
- seasonality of outside deployments;
- timing and adoption of the global rollout of new technologies;
- customer-specific financial conditions;
- changes in customer preferences or requirements;

- availability and cost of capital;
- governmental regulation;
- demand for network services;
- competitive pressures, including pricing pressures;
- customer acceptance of new services offered;
- industry consolidation; and
- real or perceived trends or uncertainties in these factors.

As a result of these factors, we may not be able to maintain or increase our sales in the future, and our business, financial condition, results of operations and cash flows could be materially and adversely affected.

A substantial portion of our business is derived from a limited number of key customers and channel partners.

Our customer base includes direct customers, original equipment manufacturers (OEMs) and channel partners, which include distributors, system integrators, value-added resellers and manufacturers' representatives. For the year ended December 31, 2019, after giving effect to the Acquisition as if it happened on January 1, 2019, we would have derived approximately 21% of our consolidated net sales from our top two direct customers. Our largest customer would have been Comcast, accounting for approximately 13% of our consolidated net sales, after giving effect to the Acquisition. The concentration of our net sales with these key customers subjects us to a variety of risks including:

- lower sales that could result from the loss of one or more of our key customers;
- less efficient operations that could result in higher costs from an inability to accurately forecast and plan for volatile spending patterns of key customers;
- renegotiations of agreements with key customers (or consolidation of agreements with common customers in connection with the Acquisition) that could result in materially less favorable terms;
- financial difficulties experienced by one or more of our key customers that could result in reduced purchases of our products and/or delays or difficulties in collecting accounts receivable balances;
- election by our key customers to purchase products from our competitors in order to diversify their supplier base and dual-source key products, resulting in reduced purchases of our products;
- being dependent on customers with substantial purchasing power and leverage in negotiating contractual obligations, resulting in lower net sales and gross profit; and
- reductions in inventory levels held by channel partners and OEMs, which may be unrelated to purchasing trends by end customers.

We are also exposed to similar risks to the extent that we have significant indirect sales to one or more end-users of our products, who may also be a direct customer.

We generally have no minimum purchase commitments with any of our distributors, value-added resellers, operators or OEMs or other customers, and our contracts with these parties generally do not prohibit them from purchasing or offering products or services that compete with ours. Although we maintain long-term relationships with these parties and have not historically lost key customers, we have experienced variability in the level of purchases by our key customers. Any significant reduction in sales to these customers, including as a result of the inability or unwillingness of these customers to continue purchasing our products, could materially and adversely affect our business, financial condition, results of operations and cash flows.

We face competitive pressures with respect to all our major product groups.

Competition in our industry depends on a number of factors, including: innovative product and service solution offerings; the ability to adapt to changing markets and customer preferences; product and service quality; timing of the introduction of new products and services; speed of delivery; pricing; and customer service, including the total customer experience.

In each of our major product groups, we compete with a substantial number of foreign and domestic companies, some of which have greater financial, technical, marketing and other resources or lower operating costs. They may also have broader product offerings and market focus. This gives many of these enterprises a competitive advantage to withstand any significant reduction in capital spending by customers in our markets over the long term. In some instances, our customers themselves may also be our competition in other business areas. Some of our customers may develop their own software requiring support within our products and/or may design and develop products of their own that are produced to their own specifications directly by a contract manufacturer. Further, our industry continues to consolidate, and the combination of any of our competitors could further increase these advantages and result in competitors with broader market presence.

Some competitors may be able to bundle their products and services together and may be capable of delivering more complete solutions that better meet customer preferences than we are able to provide, which may cause us to lose sales opportunities and revenue. Competitors' actions, such as price reductions, acceptance of high-risk contractual terms or the introduction of new, innovative products and services, and the use of exclusively price-driven auctions by customers have caused lost sales opportunities in the past and may cause us to lose sales opportunities in the future. The rapid technological changes occurring in the communications industry could also lead to the entry of new competitors against whom we may not be able to compete successfully. For example, as networks become more virtualized, the functionality of our products is at risk of being subsumed by competitors who utilize software to provide the same functions as our products. A related trend that could affect us is the emerging interest in distributed access architectures (DAA), which disaggregates some of the functions of the converged cable access platform (CCAP) and the access and transport platforms to enable deployment of these functions in ways that could reduce traditional operator capital expenditures in hybrid fiber-coaxial. Similarly, as there is technology evolution or transformation within the industry, be it DOCSIS 4.0 or PON, there is risk that our market position would be weakened. We have developed and deployed a line of DAA products, but some operators may not be aligned on the specific implementations of DAA and we could lose market share to competitors. Service providers also have the goal of virtualizing CCAP management and control functions as they deploy DAA, and although we are developing a fully virtualized CCAP product, this could potentially enable new competitors to enter the market and reduce operator dependence on our products. If any of our competitors' products or technologies were to become the industry standard, our business would be negatively affected.

Further, if we are unable to transform our business processes to support changing customer expectations and deliver a superior total customer experience, we may lose sales opportunities in the future.

Changes in trade policies could also decrease the price competitiveness of our products and/or increase our operating costs. For a more complete discussion of our risks related to trade policies, see the risk factor "Additional tariffs or a global trade war could increase the cost of our products, which could adversely impact the competitiveness of our products" under "International Risks" in this Item 1A. Risk Factors section.

We cannot assure you that we will continue to compete successfully with our existing competitors or with new competitors. If we are unable to compete in any of our markets at the same level as we have in the past or are forced to reduce the prices of our products in order to continue to be competitive, our business, financial condition, results of operations and cash flows could be materially and adversely affected.

Our ability to sell our products is highly dependent on the quality of our support and services offerings after the sale, and our failure to offer high-quality support and services after the sale would have a material adverse effect on our sales and results of operations.

After our products are deployed, our channel partners and end customers depend on our support organization to resolve any issues relating to our products. A high level of support is important for the successful marketing and sale of our products. In many cases, our channel partners provide support directly to our end-customers. We do not have complete control over the level or quality of support provided by our channel partners. These channel partners may also provide support for other third-party products, which may potentially distract resources from support for our products. If we and our channel partners do not effectively assist our end customers in deploying our products quickly resolving post-deployment issues or provide effective ongoing support, it would adversely affect our ability to sell our products to existing end customers and could harm our reputation with potential end customers. In some cases, we guarantee a certain level of performance to our channel partners and end customers, which could prove to be resource-intensive and expensive for us to fulfill if unforeseen technical problems arise.

Many of our service provider and large enterprise end customers have more complex networks and require higher levels of support than our smaller end customers. If our support organization fails to meet the requirements of our service provider or large enterprise end customers, it may be more difficult to execute on our strategy to increase our sales to large end customers. In addition, given the extent of our international operations, our support organization faces challenges, including those associated with delivering support, training and documentation in languages other than English. As a result of these factors, our failure to maintain high-quality support and services would have a material adverse effect on our business, financial condition, results of operations and cash flows.

Changes to the regulatory environment in which our customers operate and changes in or uncertainty about government funded programs may negatively impact our business.

The telecommunications and cable television industries are subject to significant and changing federal and state regulation, both in the U.S. and other countries. Many of our customers are subject to various rules and regulations as Internet service providers and changes to such rules and regulations could adversely impact our customers' decisions regarding capital spending. Some of our customers include agencies of the U.S. federal government as well as educational institutions that receive funding from the U.S. federal government. We, as well as some of our customers, also participate in and benefit from government funded programs that encourage the development of network infrastructures. Examples include FirstNet, which is an independent authority within the U.S. Department of Commerce developing, building and operating the nationwide broadband network that equips first responders, and the E-rates program, which provides supplemental funding to school districts to fund upgrades to technical infrastructure, including Wi-Fi infrastructure. Changes in government programs in our industry or uncertainty regarding future changes could adversely impact our customers' decisions regarding capital spending, which could decrease demand for our products. Decreased demand for our products could materially and adversely affect our business, financial condition, results of operations and cash flows.

Operational Risks

Our future success depends on our ability to anticipate and adapt to changes in technology and customer preferences and develop, implement and market innovative solutions.

Many of our markets are characterized by rapid advances in information processing and communications capabilities that require increased transmission speeds and density and greater bandwidth. These advances require significant investments in R&D in order to improve the capabilities of our products and services and develop new offerings or solutions that will meet the needs and preferences of our customers. There can be no assurance that our investments in R&D will yield marketable product or service innovations.

We may not be successful in our ongoing innovation efforts if, among other things, our products and services are not cost effective, brought to market in a timely manner, compliant with evolving industry standards, accepted in the market or recognized as meeting customer requirements. We could experience a material adverse effect on our business, financial condition, results of operations and cash flows if we are not successful in our ongoing innovation efforts.

As our products become more complex and customer preferences continue to change, we may encounter difficulties in meeting customer preferences, including performance, service and delivery expectations. Developing our products is expensive, complex and involves uncertainties. Each phase in the development of our products presents serious risks of failure, rework or delay, any one of which could impact the timing and cost-effective development of such product and could jeopardize end customer acceptance of the product. We have experienced in the past, and may in the future experience, design, manufacturing, marketing and other difficulties that could delay or prevent the development, introduction or marketing of new products and enhancements. Any such difficulties or delays could have a material adverse effect on our results of operations, financial condition and cash flows.

If we do not stay current with product life cycle developments, our business may suffer.

To compete successfully, we must continue to innovate in anticipation of both our customers' needs and developing industry trends, which require us to quickly design, develop, manufacture and sell new or enhanced products that provide increasingly higher levels of performance and reliability. The introduction of new or enhanced products requires that we carefully manage the transition from older products to minimize disruption in customer ordering practices and ensure that new products can be timely delivered to meet our customers' demand.

For example, a significant portion of our revenues is dependent on the commercial deployment of technologies based on 4G wireless communications equipment and products. If we are not able to support our customers in an effective and cost-efficient manner as they advance from older generation networks or as they expand the capacity of their networks, our business will suffer. If we do not have competitively priced, market-accepted products available to meet our customers' planned roll-out of 5G wireless communications systems, we may miss a significant opportunity and our business, financial condition, results of operations and cash flows could be materially and adversely affected.

Furthermore, there are several major trends that we expect to continue to impact the enterprise market and product life cycles. Enterprises are shifting toward mobility indoors and adjusting in-building cabling designs to support Wi-Fi, more access points and in-building cellular applications. Due to significant increases in data traffic and migrations of applications to the cloud, enterprises are also shifting spending toward multi-tenant data centers and hyperscale cloud service providers, which offer cloud data centers services as a replacement to in-house corporate data centers. As a result, there is growing demand for fiber solutions and decelerating demand for copper solutions. If we are unable to continue to support customers in these transitions, or if sales of copper products decline faster than expected, we could experience a material adverse effect on our business, financial condition, results of operations and cash flows.

In order to stay current with product life cycle developments, we have formed strategic relationships with leading technology companies to provide us with early access to technology that we believe will help keep us at the forefront of our industry. Our strategic alliances are generally based on business relationships that have not been the subject of written agreements expressly providing for the alliance to continue for a significant period of time, and the loss of any such strategic relationship could have a material adverse effect on our business and results of operations.

If our products do not effectively interoperate with cellular networks and mobile devices, future sales of our products could be negatively affected.

Many of our products are designed to interoperate with cellular networks and mobile devices using Wi-Fi technology. These networks and devices have varied and complex specifications. As a result, we must ensure that our products interoperate effectively with these existing and planned networks and devices. To meet these requirements, we must continue development and testing efforts that require significant capital and employee resources. We may not accomplish these development efforts quickly or cost-effectively, or at all. If our products do not interoperate effectively, orders for our products could be delayed or cancelled, which would harm our revenue, operating results and reputation, potentially resulting in the loss of existing and potential end customers. The failure of our products to interoperate effectively with cellular networks or mobile devices may result in significant warranty, support and repair costs, divert the attention of our engineering personnel from our product development efforts and cause significant customer relations problems. In addition, our end customers may require our products to comply with new and rapidly evolving security or other certifications and standards. If our products are late in achieving or fail to achieve compliance with these certifications and standards, or our competitors achieve compliance with these certifications and standards, such end customers may not purchase our products, which would harm our business, operating results, financial condition and cash flows.

If our service offerings or products, including material purchased from our suppliers, have quality or performance issues, our business may suffer.

Our business depends on delivering products and services of consistently high quality. Many of our solutions are highly complex, and testing procedures used by us and our customers are limited to evaluating them under likely and foreseeable failure scenarios. Many of our products include both hardware and software components. It is not unusual for software, especially in earlier versions, to contain bugs that can unexpectedly interfere with expected operations. For various reasons, once deployed, our products may fail to perform as expected. Performance issues could result from faulty design, defective raw materials or components purchased from suppliers, problems in manufacturing or installation errors. We have experienced such performance issues in the past and remain exposed to such performance issues in the future. In some cases, recall of some or all affected products, product redesigns or additional capital expenditures may be required to correct a defect; and depending on the number of products affected, the cost of fixing or replacing such products could have a material impact on our operating results.

In some cases, we are dependent on a sole supplier for components used in our products. Defects in sole-sourced components subject us to additional risk of being able to quickly address any product issues or failures experienced by our customers as a result of the component defect and could delay our ability to deliver new products until the defective components are corrected or a new supplier is identified and qualified. This could increase our costs in resolving the product issue, result in decreased sales of the impacted product or damage our reputation with customers, any of which could negatively impact our operating results.

Hardware or software defects could also permit unauthorized users to gain access to our customers’ networks and/or a consumer’s home network. In addition to potentially damaging our reputation with customers, such defects may also subject us to claims for damages under agreements with our customers and fines by regulatory authorities.

We offer warranties on most products, the terms and conditions of which depend upon the product subject to the warranty. In many cases, we also indemnify our customers against damages or losses that might arise from certain claims relating to our products and services. Future claims may have a material adverse effect on our business, financial condition, results of operations and cash flows. Any significant or systemic product or service failure could also result in lost future sales as a result of reputational damage.

Although certain technical problems experienced by users may not be caused by our products, our business and reputation may be harmed if users perceive our products as the cause of a slow or unreliable network connection, or a high-profile network failure.

Our products have been deployed in many different locations and user environments and are capable of providing services and connectivity to many different types of devices operating a variety of applications. The ability of our products to operate effectively can be negatively impacted by many different elements unrelated to our products. For example, a user's experience may suffer from an incorrect setting in a Wi-Fi device. Although certain technical problems experienced by users may not be caused by our products, users often may perceive them to be the underlying cause of poor performance of the wireless network. This perception, even if incorrect, could harm our business and reputation. Similarly, a high-profile network failure may be caused by improper operation of the network or failure of a network component that we did not supply, but service providers may perceive that our products were implicated, which, even if incorrect, could harm our business, financial condition, results of operations and cash flows.

We depend on cloud computing infrastructure operated by third-parties and any disruption in these operations could adversely affect our business.

For certain of our service offerings, in particular our Wi-Fi-related cloud services, we rely on third parties to provide cloud computing infrastructure that offers storage capabilities, data processing and other services. We currently operate our cloud-dependent services using Amazon Web Service (AWS) or Google Compute Engine (GCE). We cannot easily switch our AWS or GCE operations to another cloud provider. Any disruption of or interference with our use of these cloud services would impact our operations and our business could be adversely impacted.

Problems faced by our third-party cloud services with the telecommunications network providers with whom we or they contract or with the systems by which our telecommunications providers allocate capacity among their customers, including us, could adversely affect the experience of our end customers. If AWS and GCE are unable to keep up with our needs for capacity, this could have an adverse effect on our business. Any changes in third-party cloud services or any errors, defects, disruptions or other performance problems with our cloud-based applications, could adversely affect our reputation and may damage our end customers' stored files or result in lengthy interruptions in our services. Interruptions in our services might adversely affect our reputation and operating results, cause us to issue refunds or service credits, subject us to potential liabilities or result in contract terminations.

Our business depends on effective management information systems.

We rely on effective management information systems for critical business operations, to support strategic business decisions and to maintain a competitive edge in the marketplace. We rely on our enterprise resource planning (ERP) systems to support critical business operations such as processing sales orders and invoicing, manufacturing, shipping, inventory control, purchasing and supply chain management, human resources and financial reporting. We expect to begin the upgrade of our ERP software to a newer, cloud-based version in 2020. We may experience difficulties as we transition to the upgraded systems, including loss or corruption of data, delayed shipments, decreases in productivity as personnel implement and become familiar with new systems and processes, unanticipated expenses (including increased costs of implementation or costs of conducting business) and lost revenue. Difficulties in implementing the upgrade or significant system failure could disrupt our operations, divert management's attention and have an adverse effect on our capital resources, financial condition, results of operations or cash flows.

We also rely on management information systems to produce information for business decision-making and planning and to support e-commerce activities. Failure to maintain an adequate digital platform or to make additional investment in our digital platform to support e-commerce activities and improve our customer experience could have a material adverse impact on our business through lost sales opportunities.

If we are unable to maintain our management information systems, including our IT infrastructure, to support critical business operations, produce information for business decision-making activities and support e-commerce activities, we could experience a material adverse impact on our business or an inability to timely and accurately report our financial results.

Cyber-security incidents, including data security breaches, ransomware or computer viruses, could harm our business by exposing us to various liabilities, disrupting our delivery of products and services and damaging our reputation.

We rely extensively on our management information technology systems and those of third parties to operate our business and store proprietary information about our products and intellectual property. Additionally, we and others acting on our behalf receive, process, store and transmit confidential data, including "personally identifiable information," with respect to employees, vendors, customers and others. As the recent rise in cybersecurity incidents around the world indicates, all management information technology systems are vulnerable. Despite the security controls we have in place, our facilities, systems and procedures, and those of our third-party service providers, are at risk of security breaches, acts of vandalism, ransomware, software viruses, misplaced or lost data, programming and/or human errors or other similar events. In particular, unauthorized access to our computer systems or stored data could result in the theft or improper disclosure of proprietary, confidential or sensitive information, the deletion or modification of records or interruptions in our operations. These cybersecurity risks increase when we transmit information from one location to another, including transmissions over the Internet or other electronic networks. Any future significant compromise or breach of our data security, whether external or internal, or misuse of employee, vendor, customer, or Company data, could result in significant costs, lost sales, fines, lawsuits, and damage to our reputation. We employ a variety of security breach countermeasures and security controls designed to mitigate these risks, but we cannot guarantee that all breach attempts can be successfully thwarted by these measures as the sophistication of attacks increases. As cyber threats continue to evolve, we may be required to expend additional resources to mitigate new and emerging threats while continuing to enhance our information security capabilities or to investigate and remediate security vulnerabilities.

In addition, defects in some of the hardware or software we develop and sell, or in their implementation by our customers, could also result in unauthorized access to our customers' and/or consumers' networks. Any such events could result in theft of trade secrets and intellectual property; give rise to legal proceedings; cause us to incur increased costs for insurance premiums, security, remediation and regulatory compliance; subject us to civil and criminal penalties; expose us to liabilities to our customers, employees, vendors, governmental authorities or other third parties; allow others to unfairly compete with us; disrupt our delivery of products and services; expose the confidential information of our clients and others; and have a negative impact on our reputation, all of which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Because of the nature of information that may pass through or be stored on our solutions or networks, we and our end customers may be subject to complex and evolving U.S. and foreign laws and regulations regarding privacy, data protection and other matters.

Globally, there has been an increase in laws and regulatory action relating to privacy-related matters. Some of these laws impose requirements for the handling of personal data, including data of employees, consumers and business contacts. Several U.S. states have adopted legislation requiring companies to protect the security of personal information that they collect from consumers over the Internet, and more states may adopt similar legislation. For example, California enacted the California Consumer Privacy Act on January 1, 2020, which subjects us to stricter obligations, greater fines and more private causes of action related to data security. Also, many jurisdictions have enacted or are enacting laws requiring companies to notify regulators or individuals of data security incidents involving certain types of personal data. These mandatory disclosures regarding security incidents often lead to widespread negative publicity. Any security incident, whether actual or perceived, could harm our reputation, erode customer confidence in the effectiveness of our data security measures, negatively impact our ability to attract or retain customers, or subject us to third-party lawsuits, regulatory fines or other action or liability, which could materially and adversely affect our business and operating results.

Foreign data protection, privacy and other laws and regulations can be more restrictive than those in the U.S. For example, the EU's General Data Protection Regulation (GDPR), which became effective in May 2018, was designed to harmonize data privacy laws across Europe, to protect and empower all EU citizens' data privacy and to reshape the way organizations across the region approach data privacy. Compliance with GDPR has required changes to products and service offerings, internal and external software systems, including our websites, and changes to many company processes and policies. Failure to comply with GDPR could cause significant penalties and loss of business.

In addition, some countries are considering or have passed legislation requiring local storage and processing of data. For example, Brazil and India have each adopted such laws that became effective in January 2020. These new and proposed laws could increase the cost and complexity of offering our solutions or maintaining our business operations in those jurisdictions. The introduction of new solutions or expansion of our activities in certain jurisdictions may subject us to additional laws and regulations. Our channel partners and end customers also may be subject to such laws and regulations in the use of our products and services.

These U.S. federal and state and foreign laws and regulations, which often can be enforced by private parties or government entities, are constantly evolving. In addition, the application and interpretation of these laws and regulations are often uncertain, may be interpreted and applied inconsistently from jurisdiction to jurisdiction and may be contradictory with each other. For example, a government entity in one jurisdiction may demand the transfer of information forbidden from transfer by a government entity in another jurisdiction. If our actions were determined to be in violation of any of these disparate laws and regulations, in addition to the possibility of fines, we could be ordered to change our data practices, which could have an adverse effect on our business and results of operations and financial condition. 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 or regulations applicable in a jurisdiction regarding the collection, handling, transfer, disposal or consent to the use of personal data, which could subject us to fines or other sanctions, as well as adverse reputational impact.

Compliance with these existing and proposed laws and regulations can be costly and require significant management time and attention, and failure to comply can result in negative publicity and subject us to inquiries or investigations, claims or other remedies, including fines or demands that we modify or cease existing business practices. Customers may demand or request additional functionality in our products or services that they believe are necessary or appropriate to comply with such laws and regulations, which can cause us to incur significant additional costs and can delay or impede the development of new solutions. In addition, there is a risk that failures in systems designed to protect private, personal or proprietary data held by us or our customers using our solutions will allow such data to be disclosed to or seen by others, resulting in application of regulatory penalties, enforcement actions, remediation obligations, private litigation by parties whose data were improperly disclosed or claims from our customers for costs or damages they incur. There can be no assurance that the limitations of liability in our contracts would be enforceable or adequate or would otherwise protect us from any such liabilities or damages with respect to any particular claim. Our existing general liability insurance coverage and coverage for errors and omissions may not continue to be available on acceptable terms or may not be available in sufficient amounts to cover one or more large claims, or our insurers may deny coverage as to any future claim. The successful assertion of one or more large claims against us that exceeds available insurance coverage, or the occurrence of changes in our insurance policies, including premium increases or the imposition of large deductible or co-insurance requirements, could have a material adverse effect on our business, financial condition, results of operations and cash flow.

If our integrated global manufacturing operations suffer production or shipping delays, we may have difficulty meeting customer demands.

Disruption of our ability to produce at or distribute from our manufacturing or contract manufacturing facilities could adversely affect our ability to manufacture products at our other manufacturing or contract manufacturing facilities in a cost-effective and timely manner. In particular, some of our manufacturing and contract manufacturing facilities rely on aging production equipment and information technology infrastructure, and if we fail or our contract manufacturers fail to properly maintain or update this equipment, it could affect our ability to manufacture or ship products. Other disruptions, including labor disturbances, fire, electrical outage, natural disaster, pandemics, acts of violence or terrorism, shipping interruptions or some other catastrophic event could adversely affect our ability to manufacture products at our other manufacturing or contract manufacturer facilities in a cost-effective and timely manner, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

The continued industry move to open standards may impact our future results.

Our industry has and will continue to demand products based on open standards. The move toward open standards is expected to increase the number of providers that will offer services to the market. This trend is also expected to increase the number of competitors who are able to supply products to service providers and the enterprise market. These factors may adversely impact our future revenues and margins. In addition, many of our customers participate in "technology pools" and increasingly request that we donate a portion of our source code used by customers to these pools, which may impact our ability to recapture the R&D investment made in developing such code.

We believe that we will be increasingly required to work with third-party technology providers. As a result, we expect the shift to more open standards may require us to license software and other components indirectly to third parties via various open-source or royalty-free licenses. In some circumstances, our use of such open-source technology may include technology or protocols developed by standards settings bodies, other industry forums or third-party companies. The terms of the open-source licenses granted by such parties, or the granting of royalty-free licenses, may limit our ability to commercialize products that utilize such technology, which could have a material adverse effect on our results.

Climate change may have a long-term impact on our business.

While we seek to partner with organizations that mitigate their business risks associated with climate change, we recognize that there are inherent risks wherever business is conducted. The potential physical impacts of climate change on our operations are highly uncertain and would be particular to the geographic circumstances in areas in which we operate. These may include changes in rainfall and storm patterns and intensities, water shortages, changing sea levels and changing temperatures. These impacts may adversely impact the cost, production and financial performance of our operations. Climate-related events, including the increasing frequency of extreme weather events and their impact on U.S., China and other major regions' critical infrastructure, have the potential to disrupt our business, our third-party suppliers, and/or the business of our customers and may cause us to experience higher attrition, losses and additional costs to maintain or resume operations. CommScope aligns with the Global Reporting Initiative (GRI) standard and makes use of the Carbon Disclosure Project (CDP) platform, which is committed to aligning with the Task Force on Climate Related Financial Disclosures (TCFD) recommendations to accurately assess, take potential proactive action and report as appropriate. For additional information, see our Corporate Responsibility & Sustainability pages on the CommScope website: https://www.commscope.com/About-Us/Corporate-Responsibility-and-Sustainability.

Supply Chain Risks

Our dependence on commodities subjects us to cost volatility and potential availability constraints.

Our profitability may be materially affected by changes in the market price and availability of certain raw materials, most of which are linked to the commodity markets. The principal raw materials and components we purchase are made of metals such as copper, steel, aluminum or brass, plastics and other polymers and optical fiber. Fabricated copper, steel and aluminum are used in the production of coaxial and twisted pair cables, and polymers are used to insulate and protect cables. Prices for copper, steel, aluminum, fluoropolymers and certain other polymers derived from oil and natural gas have experienced significant volatility as a result of changes in the levels of global demand, supply disruptions and other factors. As a result, we have adjusted our prices for certain products and may have to adjust prices again in the future. Delays in implementing price increases or a failure to achieve market acceptance of price increases has in the past, and could in the future, have a material adverse impact on our results of operations. In an environment of falling commodities prices, we may be unable to sell higher-cost inventory before implementing price decreases, which could have a material adverse impact on our business, financial condition and results of operations.

We are dependent on a limited number of key suppliers for certain raw materials and components.

We are dependent on a limited number of key suppliers for certain of our raw material and component purchases, including certain memory and chip capacitors, polymers, copper rod, copper and aluminum tapes, fine aluminum wire, steel wire, optical fiber, circuit boards and other electronic components, subassemblies and modules. Certain of our suppliers are sole source suppliers and a number of our agreements with suppliers are short-term in nature.

Our reliance on sole or limited suppliers, particularly foreign suppliers, and our reliance on subcontractors involves several risks, including a potential inability to obtain an adequate supply of required materials, components and other products, and reduced control over pricing, quality and timely delivery. Current limited supply of components in the memory and passives categories could impact our ability to deliver on a timely basis and increase overall product costs. Our key suppliers have experienced in the past, and could experience in the future, production, operational or financial difficulties, or there may be global shortages of certain raw materials or components we use. Our inability to find sufficient sources of supply on reasonable terms could impact our ability to manufacture products in a cost-effective manner, which could have a material adverse effect on our gross margin and results of operations. It could also affect our ability to ship products on a timely basis, which could damage relationships with current and prospective customers and potentially have a material adverse effect on our business.

We also source many of our components from international markets. Any changes in the laws and policies of the U.S. or other countries affecting trade is a risk to us. To the extent there are unfavorable changes imposed by the U.S. or other countries and/or retaliatory actions taken by trading partners, such as the addition of new tariffs or trade restrictions, we may experience material adverse impacts on earnings. For a more complete discussion of our risks related to tariffs and trade restrictions, see the risk factor, “Additional tariffs or a global trade war could increase the cost of our products, which could adversely impact the competitiveness of our products” under our “International Risk Factors” in this Item 1A. Risk Factors section.

Capacity constraints with respect to our internal facilities and/or existing or new contract manufacturers could have an adverse impact on our business.

We internally produce, both domestically and internationally, a portion of the components used in our finished products. We also rely on third-party contract manufacturers, both domestically and internationally, to produce certain products or key components of products. If we do not have sufficient production capacity, either through our internal facilities or independent contract manufacturers, or if we cannot ramp up capacity for complex products fast enough to meet customer demand, we may experience lost sales opportunities, lost market share and customer relations problems, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

If our contract manufacturers encounter production, quality, financial or other difficulties we may experience difficulty in meeting customer demands.

We rely on unaffiliated contract manufacturers, both domestically and internationally, to produce certain products or key components of products. Our reliance on these contract manufacturers reduces our control over the manufacturing process and exposes us to risks, including reduced control over quality assurance, product costs and product supply and timing. Any manufacturing disruption by these contract manufacturers could severely impair our ability to fulfill orders. Our reliance on outsourced manufacturers also increases the potential for infringement or misappropriation of our intellectual property. If we are unable to manage our relationships with our contract manufacturers effectively, or if our contract manufacturers suffer delays or disruptions for any reason, including financial instability, labor disturbances or geopolitical instability, experience increased manufacturing lead-times, capacity constraints or quality control problems in their manufacturing operations, or fail to meet our future requirements for timely delivery, our ability to ship products to our customers may be impaired, and our business and operating results could be harmed.

These manufacturers typically fulfill our supply requirements on the basis of individual orders. In most cases, we do not have long-term contracts with our contract manufacturers that guarantee capacity, the continuation of particular pricing terms or the extension of credit limits. Accordingly, our contract manufacturers are not obligated to continue to fulfill our supply requirements, which could result in supply shortages, and the prices we are charged for manufacturing services could be increased on short notice. In addition, as a result of fluctuating global financial market conditions, natural disasters or other causes, it is possible that any of our manufacturers could experience interruptions in production, cease operations or alter our current arrangements. If our manufacturers are unable or unwilling to continue manufacturing our products in required volumes, we will be required to identify one or more acceptable alternative manufacturers.

Additionally, with the current U.S. trade tariff environment, we are transitioning manufacturing for certain impacted products to non-tariff countries. It is time-consuming and costly, and changes in our contract manufacturers or manufacturing locations may cause significant interruptions in supply if the manufacturers have difficulty manufacturing products to our specifications. As a result, our ability to meet our scheduled product deliveries to our customers could be adversely affected, which could cause the loss of sales to existing or potential customers, delayed revenue or an increase in our costs.

Production interruptions for any reason, such as a natural disaster, epidemic, capacity shortages or quality problems, at one of our manufacturers would negatively affect sales of our products that are manufactured by that manufacturer or utilize components produced by that manufacturer. Such difficulties could adversely affect our business, financial condition, results of operations and cash flows.

Strategic Risks

Our business strategy relies in part on acquisitions to create growth. We may not fully realize anticipated benefits from past or future acquisitions or investments in other companies.

For a discussion of the risks associated with the recent acquisition of ARRIS, see the “ARRIS Acquisition Risks” noted above under this Item 1A. Risk Factors section.

Both CommScope and ARRIS have completed a number of significant acquisitions and invested in other companies over recent years and we expect to make additional acquisitions and strategic investments in the future. For instance, in 2017, ARRIS acquired the Ruckus Wireless and ICX Switch business (Ruckus Networks); in 2016, ARRIS combined with Pace plc (Pace); and in 2015, CommScope acquired TE Connectivity’s BNS business. We anticipate that a portion of any future growth of our business will be accomplished by acquiring existing businesses, products or technologies. However, we may not be able to identify suitable acquisition opportunities or obtain the necessary financing on acceptable terms. We may spend time and money investigating and negotiating with potential acquisition or investment targets but not complete the transaction.

Any future acquisition could involve risks, including the assumption of additional liabilities and expenses, issuance of debt, incurrence of transaction and integration costs, diversion of management’s attention from other business concerns, assumption of unknown contingent liabilities and unanticipated litigation costs. Furthermore, such acquisition may be dilutive to our financial results. There are also significant challenges to integrating an acquired operation into our business, including, but not limited to successfully managing the operations, manufacturing facilities and technology; integrating the sales organizations; maintaining and increasing the customer base; retaining key employees, suppliers and distributors; integrating management information systems, including ERP systems; integrating inventory management and accounting activities; integrating R&D activities; navigating markets in which we potentially have limited or no prior experience; integrating and implementing effective disclosure controls and procedures and internal controls over financial reporting; addressing operating losses that may exist related to individual markets, facilities or product lines; and the impact of goodwill or other impairment charges, amortization costs for acquired intangible assets and acquisition accounting treatment, including the loss of deferred revenue and increases in the fair values of inventory and other acquired assets, on our GAAP financial condition and results of operations.

Although we expect to realize strategic, operational and financial benefits as a result of the recent acquisition of ARRIS, as well as past and future acquisitions and investments, we cannot predict or guarantee whether and to what extent anticipated cost savings, synergies and growth prospects will be achieved.

We may sell or discontinue one or more of our product lines as a result of our evaluation of our products and markets.

We periodically evaluate our various product lines and may consider the divestiture or discontinuance of one or more of those product lines. Any such divestiture or discontinuance could adversely affect our financial position, results of operations and cash flows. Divestitures of product lines have inherent risks, including the expense of selling the product line; the possibility that any anticipated sale will not occur; possible delays in closing any sale; the risk of lower-than-expected proceeds from the sale of the divested business; unexpected costs, including those associated with the separation of the business to be sold, from our management information and other operating systems; distracting employees; potential post-closing claims for indemnification; and potential loss of customers. Expected cost savings may also be difficult to achieve or maximize due to a fixed cost structure, and we may experience varying success in the timely reduction of fixed costs or transferring of liabilities previously associated with the divested or discontinued business.

Difficulties may be encountered in the realignment of manufacturing capacity and capabilities among our global manufacturing facilities and our contract manufacturers that could adversely affect our ability to meet customer demand for our products.

We periodically realign manufacturing capacity among our global facilities and contract manufacturers in order to reduce costs by improving manufacturing efficiency and to strengthen our long-term competitive position. The implementation of these initiatives may include significant shifts of production capacity among facilities and contract manufacturers. For example, with the current U.S. trade tariff environment, we are transitioning manufacturing for certain impacted products to non-tariff countries. It is time-consuming and costly, and changes in our contract manufacturers or manufacturing locations may cause significant interruptions in supply if the manufacturers have difficulty manufacturing products to our specifications. There are significant risks inherent in the implementation of these initiatives, including our failure to ensure the following: adequate inventory on hand or production capacity to meet customer demand while capacity is being shifted among facilities; maintaining product quality as a result of shifting capacity; adequate raw material and other service providers to meet the needs at the new production locations; ability to successfully remove, transport and re-install equipment; and availability of adequate supervisory, production and support personnel to accommodate the shifted production. In the event manufacturing realignment initiatives are not successfully implemented, we could experience lost future sales and increased operating costs, as well as customer relations problems, any of which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

We may need to undertake additional restructuring actions in the future.

We have previously recognized restructuring charges in response to slowdowns in demand for our products and in conjunction with the implementation of initiatives to reduce costs and improve efficiency of our operations. Most recently, we have undertaken a number of initiatives to support the integration of ARRIS, which include mostly workforce reductions, and in the past, we have undertaken initiatives to support the integration of other acquisitions, which included the closure of certain domestic and international manufacturing facilities and various other workforce reductions. As a result of the continued integration efforts related to the acquisition of ARRIS, changes in business conditions and other developments, we may need to initiate additional restructuring actions that could result in workforce reductions and restructuring charges, which could adversely and materially affect our cash flows.

Financial Risks

Our substantial indebtedness could adversely affect our ability to raise additional capital to fund our operations, limit our ability to react to changes in the economy or our industry, expose us to interest rate risk to the extent of our variable rate debt and prevent us from meeting our obligations with respect to our indebtedness.

See Note 8 in the Notes to Consolidated Financial Statements included in this Form 10-K for additional details of our indebtedness. As of December 31, 2019, we had approximately $10.0 billion of indebtedness. This includes indebtedness issued prior to the Acquisition and indebtedness issued in connection with the Acquisition. As of December 31, 2019, we had no outstanding loans under our new asset-based revolving credit facility and approximately $796.8 million in borrowing capacity. Our ability to borrow under our revolving credit facility depends, in part, on inventory, accounts receivable and other assets that fluctuate from time to time and may further depend on lenders’ discretionary ability to impose reserves and availability blocks. We have entered into certain hedging agreements to reduce our exposure to variable rate debt.

Our substantial indebtedness could have important consequences. For example, it could:

- limit our ability to obtain additional financing for working capital, capital expenditures, acquisitions, investments and other general corporate purposes;
- require a substantial portion of our cash flows to be dedicated to debt service payments and reduce the amount of cash flows available for working capital, capital expenditures, investments or acquisitions and other general corporate purposes;
- expose us to the risk of increased interest rates as the interest cost on a significant portion of our indebtedness is subject to changes in interest rates;
- place us at a competitive disadvantage compared to certain of our competitors who have less debt;
- hinder our ability to adjust rapidly to changing market conditions;
- limit our ability to secure adequate bank financing in the future with reasonable terms and conditions; and
- increase our vulnerability to and limit our flexibility in planning for, or reacting to, a potential downturn in general economic conditions or in one or more of our businesses.

Our variable rate indebtedness currently uses LIBOR as a benchmark for establishing the rate. On July 27, 2017, the authority that regulates LIBOR announced that it intends to stop compelling banks to submit rates for the calculation of LIBOR after 2021. It is unclear whether new methods of calculating LIBOR will be established such that it continues to exist after 2021. The U.S. Federal Reserve, in conjunction with the Alternative Reference Rates Committee, is considering replacing U.S. dollar LIBOR with a newly created index, calculated with a broad set of short-term repurchase agreements backed by treasury securities, called the Secured Overnight Financing Rate. It is not possible to predict the effect of these changes, other reforms or the establishment of alternative reference rates in the United Kingdom (U.K.), the U.S. or elsewhere. These changes could require us to renegotiate certain of our variable rate indebtedness to address changes in the benchmark rates.

In addition, the indentures and credit agreements governing our indebtedness contain affirmative and negative covenants that limit our ability to engage in activities that may be in our long-term best interests. Our failure to comply with those covenants could result in an event of default which, if not cured or waived, could result in the acceleration of all of our debt.

Despite current indebtedness levels and restrictive covenants, we may still incur additional indebtedness that could further exacerbate the risks associated with our substantial financial leverage.

We may incur significant additional indebtedness in the future under the agreements governing our indebtedness. Although the indentures and the credit agreements governing our indebtedness contain restrictions on the incurrence of additional indebtedness, these restrictions are subject to a number of thresholds, qualifications and exceptions, and additional indebtedness incurred in compliance with these restrictions could be substantial. Additionally, these restrictions permit us to incur obligations that, although preferential to our common stock in terms of payment, do not constitute indebtedness.

To service our indebtedness and pay dividends on our preferred stock, we will require a significant amount of cash and our ability to generate sufficient cash depends on many factors beyond our control.

Our operations are conducted through our global subsidiaries and our ability to make cash payments on our indebtedness and pay cash dividends on our preferred stock will depend on the level of earnings and distributable funds from our subsidiaries. Certain of our subsidiaries may have limitations or restrictions on paying dividends and otherwise transferring funds to us. Our ability to make cash payments on and to refinance our indebtedness will depend upon our financial condition and operating performance, which are subject to prevailing economic and competitive conditions and to financial, business, legislative, regulatory and other factors beyond our control. We might not be able to achieve a level of cash flows from operating activities or transfer sufficient funds from our subsidiaries to permit us to pay the principal, premium, if any, and interest on our indebtedness and dividends on our preferred stock.

If we are unable to generate sufficient cash flow or are otherwise unable to obtain funds necessary to meet required payments of principal, premium, if any, and interest on our indebtedness or if we fail to comply with the various covenants in the instruments governing our indebtedness and we are unable to obtain waivers from the required lenders, we could be in default under the terms of the agreements governing such indebtedness. In the event of such default, the holders of our indebtedness could elect to declare all the funds borrowed to be due and payable, together with accrued and unpaid interest. The lenders under our revolving credit facility could elect to terminate their commitments, cease making further loans and institute foreclosure proceedings against our assets. As a result, we could be forced into bankruptcy or liquidation.

If we do not obtain the necessary stockholder approval, we may not be able to pay dividends in kind on our Series A Convertible Preferred Stock.

At the 2020 Annual Meeting, our stockholders will be asked to vote on a proposal to approve the issuance of shares of common stock to Carlyle in connection with any future conversion or redemption of the Series A Convertible Preferred Stock into common stock, any issuance of common stock to Carlyle as a dividend-in-kind, or pursuant to Carlyle’s participation rights, which, absent such approval, would be prohibited under Nasdaq Listing Rule 5635. If this approval is not obtained, we could be unable to issue shares of common stock to Carlyle in excess of the maximum amount permitted under the listing rules of NASDAQ and, as a result, we would have to settle certain obligations to Carlyle in cash. In addition, if this approval is not obtained, we will not be able to pay dividends-in-kind on the Series A Convertible Preferred Stock. To the extent that we are not able to pay dividends-in-kind, we will have to pay dividends in cash, which could have a material adverse impact on our cash flows and reduce the amount of cash available for working capital, debt reduction, capital expenditures, growth opportunities, acquisitions and other general corporate purposes.

We may need to recognize additional impairment charges related to goodwill, identified intangible assets and fixed assets.

We have substantial balances of goodwill and identified intangible assets. As of December 31, 2019, goodwill and identified intangible assets represented approximately 67% of our total assets. We are required to test goodwill for possible impairment on the same date each year and on an interim basis if there are indicators of a possible impairment. In connection with our annual assessment for impairment of goodwill in 2019, we recorded an impairment charge to goodwill of $376.1 million in the fourth quarter of 2019. If we are unable to improve our results of operations and cash flows, or other indicators of impairment exist, such as a sustained significant decline in our share price and market capitalization, we may incur another, material charge against earnings relating to our remaining goodwill.

We are also required to evaluate identified intangible assets and fixed assets for impairment if there are indicators of a possible impairment. In the past, due to revisions in financial performance outlooks or deterioration in certain markets, we have recognized significant impairment charges on identified intangible assets and fixed assets. In the future, we may again determine that one or more of our long-lived assets is impaired and additional impairment charges may be recognized that could have a material adverse effect on our financial condition and results of operations.

We may experience significant variability in our quarterly or annual effective income tax rate.

We have a large and complex international tax profile and a significant level of tax credit carryforwards in the U.S. and other carryforwards in various jurisdictions. Variability in the mix and profitability of domestic and international activities, identification and resolution of various tax uncertainties and the inability to realize tax credits and other carryforwards included in deferred tax assets, among other matters, have impacted our effective income tax rate in the past and may impact our effective income tax rate in the future. Tax law changes in the U.S. and certain other countries have also impacted our effective income tax rate in the past and may impact our effective tax rate in the future. A significant increase in our quarterly or annual effective income tax rate could have a material adverse impact on our results of operations.

We are commonly audited by various tax authorities, and some jurisdictions, both in the U.S. and abroad, have become more aggressive in their approach to audits and their enforcement of their applicable tax laws. In the ordinary course of our business, there are many transactions and calculations where the ultimate tax determination is uncertain. Significant judgment is required in determining our worldwide provision for income taxes. Although we believe our tax estimates are reasonable, the final determination of tax audits and any related litigation could be materially different from our historical income tax provisions and accruals. The results of an audit or litigation could have a material effect on our financial statements in the period or periods for which that determination is made and on our overall effective income tax rate.

The IRS may not agree ARRIS was a foreign corporation for U.S. federal income tax purposes.

Following the Pace combination, ARRIS was incorporated under the laws of England and Wales and a tax resident in the United Kingdom for U.K. tax purposes. There is a risk that the Internal Revenue Service does not agree that ARRIS was a foreign corporation for U.S. federal income tax purposes in periods prior to the Acquisition and we could be subject to substantial additional U.S. taxes. For U.K. tax purposes, ARRIS was expected to be treated as a U.K. tax resident for all periods prior to the Acquisition and following the Pace combination, regardless of how ARRIS was treated in the U.S. Therefore, if ARRIS was treated as a U.S. corporation for U.S. federal income tax purposes, we could be liable for both U.S. and U.K. taxes in certain periods prior to the Acquisition, which could have a material adverse effect on our financial condition, results of operations and cash flows.

Labor Related Risks

We may not be able to attract and retain key employees.

Our business depends upon our continued ability to hire and retain key employees. Effective succession planning is important to our long-term success. We depend on our senior management team and other key employees for strategic success. Some of our key employees have retired, announced their decision to retire or are at or near retirement age. Failure to ensure effective transfer of knowledge and smooth transitions involving key employees could hinder our strategic planning and execution.

Key employees include individuals in our sales force, operations management, engineers and skilled production workers at our operations around the world. Competition for skilled personnel and highly qualified managers in the industries in which we operate is intense. Our growth by acquisitions creates challenges in retaining employees as well. As the corporate culture evolves to incorporate new workforces, some employees may not find the new culture appealing. In addition, the pace of integration may cause retention issues with our workforce due to integration fatigue.

Furthermore, as our workforce ages, we are challenged to find and attract a younger population to replace them. Younger generations are motivated by progression and opportunity, which may be limited by our current employee population. In addition, many of our employees are highly experienced, skilled individuals who have extensive knowledge or relationships in our industry. As these employees leave CommScope, we may not be able to easily replicate their experience, knowledge and relationships. Difficulties in attracting or retaining employees with the necessary management, technical and financial skills needed to achieve our business objectives may limit our growth potential and may have a material adverse effect on our business, financial condition and results of operations.

Labor unrest could have a material adverse effect on our business, results of operations and financial condition.

Although none of our U.S. employees are represented by unions, a significant portion of our international employees are members of unions or subject to works' councils or similar statutory arrangements. We are required to consult with, and seek the consent or advice of, various employee groups or works' councils that represent our employees for any changes to our activities or employee benefits. This requirement could have a significant impact on our flexibility in managing costs and responding to market changes. In addition, many of our direct and indirect customers and vendors have unionized workforces. Strikes, work stoppages or slowdowns experienced by us at our international locations or experienced by our customers or vendors could have a negative impact on us. Organizations responsible for manufacturing or shipping our products may also be impacted by labor disruptions. Any interruption in the delivery of our products could harm our reputation with our customers, reduce demand for our products, increase costs and have a material adverse effect on us.

International Risks

Our significant international operations expose us to economic, political and other risks.

We have significant international sales, manufacturing, distribution and R&D operations. Our major international manufacturing, distribution and R&D facilities are located in Australia, Belgium, China, the Czech Republic, France, Germany, India, Ireland, Israel, Mexico, Singapore, Sweden and the United Kingdom. For the year ended December 31, 2019, international sales represented 41% of our consolidated net sales. In general, our international sales have lower gross margin percentages than our domestic sales. To the extent international sales increase as a percentage of our net sales, our overall gross margin percentages may decline.

Our international sales, manufacturing, distribution and R&D operations are subject to the risks inherent in operating abroad, including, but not limited to, coordinating communications among and managing international operations; currency exchange rate fluctuations; economic and political destabilization; restrictive actions by foreign governments; wage inflation; nationalizations; the laws and policies of the U.S. and other countries affecting trade, anti-bribery, foreign investment and loans; foreign tax laws, including the ability to recover amounts paid as value-added and similar taxes; potential restrictions on the repatriation of cash; reduced protection of intellectual property; longer customer payment cycles; compliance with local laws and regulations; volatile geopolitical turmoil, including popular uprisings, regional conflicts, terrorism, and war; shipping interruptions; major health concerns (such as infectious diseases); inflexible labor contracts or labor laws in the event of business downturns; and economic boycott for doing business in certain countries.

A significant portion of our products sold in the U.S. are manufactured outside the U.S. We utilize lower-cost geographies for high labor content products while investing in largely automated plants in higher-cost regions close to customers. Most of our manufacturing employees are located in lower-cost geographies such as Mexico, China, India and the Czech Republic. To the extent there are changes in U.S. trade policies, such as significant increases in tariffs or duties for goods brought into the U.S., our competitive position may be adversely impacted and the resulting effect on our earnings could be material. For a more complete discussion of our risks related to trade policies, see the risk factor "Additional tariffs or a global trade war could increase the cost of our products, which could adversely impact the competitiveness of our products" under "International Risks" in this Item 1A. Risk Factors section.

In June 2016, the U.K. held a referendum in which voters approved an exit from the European Union (E.U.), commonly referred to as Brexit. As a result of the referendum, the British government began negotiating the terms of the U.K.'s future relationship with the E.U. in March 2017. The U.K. and E.U. entered into a withdrawal agreement whereby the U.K. left the E.U. as of January 31, 2020 but maintained access to the E.U. single market and to the global trade deals negotiated by the E.U. on behalf of its members and remained subject to E.U. law, for a transition period ending on December 31, 2020. The ongoing uncertainty within the U.K.'s government on the status of Brexit has negatively impacted the U.K.'s economy and will likely continue to have a negative impact until a definitive resolution is reached on the outstanding trade and legal matters. Even if the U.K. maintains access to the E.U. single market and trade deals following the transition period, Brexit could result in further economic downturn globally. If the U.K. ultimately loses access to the E.U. single market and trade deals, it is possible that there will be greater restrictions on imports and exports between the U.K. and E.U. countries and increased regulatory complexities. These changes could cause disruptions to and create uncertainty surrounding our business and the business of existing and future customers and suppliers as well as have an impact on our employees based in Europe, which could adversely impact our business, financial condition, results of operations and cash flows.

Risks related to fluctuations in foreign currency rates can impact our sales, results of operations, cash flows and financial position. Our foreign currency risk exposure is mainly concentrated in Chinese yuan, euro, British pound sterling, Mexican peso, Australian dollar, Brazilian real, South African rand, Indian rupee and Czech koruna. We manage our foreign currency rate risks through regular operating and financing activities and use derivative financial instruments such as foreign exchange forward contracts. There can be no assurance that our risk management strategies will be effective or that the counterparties to our derivative contracts will be able to perform. In addition, foreign currency rates in many of the countries in which we operate have at times been extremely volatile and unpredictable. We may choose not to hedge or determine we are unable to effectively hedge the risks associated with this volatility. In such cases, we may experience declines in sales and adverse impacts on earnings and such changes could be material.

Additional tariffs or a global trade war could increase the cost of our products, which could adversely impact the competitiveness of our products.

During 2018 and 2019, the U.S. administration announced tariffs on certain products imported into the U.S., which has resulted in reciprocal tariffs from other countries, including countries where we operate. For example, the U.S. has implemented tariffs on a variety of goods produced or manufactured in China, and China responded by imposing tariffs on various U.S. products. In January 2020, the two sides signed a preliminary deal, but many issues remain unresolved. Both sides have indicated that further revisions will be made during a second phase of negotiations, but the timing of any such negotiations and resolution remain uncertain. The U.S. has renegotiated the North American Free Trade Agreement with Mexico and Canada. The renegotiated agreement, called the United States Mexico Canada Agreement (USMCA), was recently ratified by Congress but remains subject to approval by the Canadian legislature, and the timing of approval is uncertain.

These developments have created uncertainty about the future relationship between the U.S. and certain of its trading partners and may reduce trade between the U.S. and other nations, including countries in which we currently operate. Changes in policy or continued uncertainty could depress economic activity and restrict our access to suppliers or customers. The tariffs implemented on our products (or on materials, parts or components we use to manufacture our products) by the U.S. will increase the cost of our products manufactured and imported into the U.S. Tariffs and other trade restrictions announced by other countries on products manufactured in the U.S. could likewise increase the costs of those products when imported into other countries. If additional tariffs or trade restrictions are implemented on our products (or on materials, parts or components we use to manufacture our products) by the U.S. or other countries, the cost of our products manufactured in China, Mexico or other countries and imported into the U.S. or other countries could increase further. We expect to continue to pass along some of these costs to our customers, but the increased cost could adversely affect the demand for products. We are in the process of shifting the manufacturing locations for the impacted products, but this takes time and these locations may have higher manufacturing costs. These cost increases could adversely affect the demand for our products and/or reduce margins, which could have a material adverse effect on our business and our earnings.

Our international operations expose us to increased challenges in complying with anti-corruption laws and regulations of the U.S. government and various other international jurisdictions.

We are required to comply with the laws and regulations of the U.S. government and various other international jurisdictions, and our failure to comply with these rules and regulations may expose us to significant liabilities. These laws and regulations may apply to companies, individual directors, officers, employees and agents, and may restrict our operations, trade practices, investment decisions and partnering activities. In particular, we are subject to U.S. and foreign anti-corruption laws and regulations, such as the U.S. Foreign Corrupt Practices Act and the U.K. Anti-Bribery Act. Violations of these legal requirements are punishable by criminal fines and imprisonment, civil penalties, disgorgement of profits, injunctions, debarment from government contracts and other remedial measures. We have established policies and procedures designed to assist us and our personnel in complying with applicable U.S. and international laws and regulations. However, our employees, subcontractors or channel partners could take actions that violate these requirements. In addition, some of the international jurisdictions in which we operate have elevated levels of corruption. As a result, we are exposed to an increased risk of violating anti-corruption laws. Violation of anti-corruption laws could adversely affect our reputation, business, financial condition, results of operations and cash flows, and such effects could be material.

We are subject to governmental export and import controls that could subject us to liability or impair our ability to compete in international markets.

Certain of our products, including purchased components of such products, are subject to export controls and may be exported only with the required export license or through an export license exemption. In addition, we are required to comply with certain U.S. and foreign import and customs rules, sanctions and embargos. If we were to fail to comply with applicable export licensing, customs regulations, economic sanctions and other laws, we could be subject to substantial civil and criminal penalties, including fines, the incarceration of responsible employees and managers and the possible loss of export or import privileges. In addition, if our distributors fail to obtain appropriate import, export or re-export licenses or permits, we may also be adversely affected through reputational harm and penalties. Obtaining the necessary export license for a particular sale may be time-consuming and may result in a delay or loss of sales opportunities.

Furthermore, export control laws and economic sanctions prohibit the shipment of certain products to embargoed or sanctioned countries, governments and persons. While we train our employees to comply with these regulations, we cannot assure you that a violation will not occur, whether knowingly or inadvertently. Any such shipment could have negative consequences, including government investigations, penalties, fines, civil and criminal sanctions and reputational harm.

Any change in export or import regulations, economic sanctions or related legislation, shift in the enforcement or scope of existing regulations or change in the countries, governments, persons or technologies targeted by such regulations could result in our decreased ability to export, import or sell our products to existing or potential customers, particularly those with international operations. Any decreased use of our products or limitation on our ability to export, import or sell our products could adversely affect our business, financial condition, results of operations and cash flows, and such effects could be material.

Litigation and Regulatory Risks

We may not be successful in protecting our intellectual property and in defending claims that we are infringing on the intellectual property of others and such actions may be costly.

We may encounter difficulties and significant costs in protecting our intellectual property rights or obtaining rights to additional intellectual property to permit us to continue or expand our business. Other companies, including some of our largest competitors, hold intellectual property rights in our industry and the intellectual property rights of others could inhibit our ability to introduce new products unless we secure necessary licenses on commercially reasonable terms.

In the past, we have initiated litigation in order to enforce patents issued or licensed to us or to determine the scope and/or validity of a third party's patent or other proprietary rights, and we may initiate similar litigation in the future. We also have been and may in the future be subject to lawsuits by third parties seeking to enforce their own intellectual property rights, including against certain of the products or intellectual property that we have acquired through acquisitions. Any such litigation, regardless of outcome, could be costly and could subject us to significant liabilities or require us to cease using proprietary third-party technology. In addition, the payment of any damages or any necessary licensing fees or indemnification costs associated with a patent infringement claim could be material and could also materially adversely affect our operating results. Such litigation can also be a significant distraction to management.

In certain markets, we may be required to address counterfeit versions of our products. We may incur significant costs in pursuing the originators of such counterfeit products and, if we are unsuccessful in eliminating them from the market, we may experience a reduction in the value of our products and/or a reduction in our net sales.

Compliance with current and future environmental laws and potential environmental liabilities may have a material adverse impact on our business, financial condition and results of operations.

We are subject to various federal, state, local and foreign environmental laws and regulations governing, among other things, discharges to air and water, management of regulated materials, handling and disposal of solid and hazardous waste and investigation and remediation of contaminated sites. In addition, we are subject to laws and regulations regarding the types of substances allowable in certain of our products and the handling of our products at the end of their useful life. Because of the nature of our business, we have incurred and will continue to incur costs relating to compliance with or liability under these environmental laws and regulations and these costs could be material. In addition, new laws and regulations, new or different interpretations of existing laws and regulations, expansion of existing legal requirements related to our products, the discovery of previously unknown contamination or the imposition of new remediation or discharge requirements could require us to incur costs or become the basis for new or increased liabilities that could have a material adverse effect on our financial condition.

Efforts to regulate emissions of greenhouse gases (GHGs), such as carbon dioxide, are underway in the U.S. and other countries, which could increase the cost of raw materials, production processes and transportation of our products. If we are unable to comply with such regulations or sufficiently increase prices or otherwise reduce costs to offset the increased costs of compliance, GHG regulation could have a material adverse effect on our business, financial condition, results of operations and cash flow. Certain environmental laws impose strict and, in some circumstances, joint and several liability on current or former owners or operators of a contaminated property, as well as companies that generated, disposed of or arranged for the disposal of hazardous substances at a contaminated property, for the costs of investigation and remediation of the contaminated property. Our present and past facilities have been in operation for many years and over that time, in the course of those operations, hazardous substances and wastes have been used, generated and occasionally disposed of at such facilities, and we have disposed of waste products either directly or through third parties at numerous disposal sites. Consequently, it has been necessary to undertake investigation and remediation projects at certain sites and we have been, and may in the future be, held responsible for a portion of the investigation and clean-up costs at these sites and our share of those costs may be material.

A number of governments or governmental bodies have also introduced or are contemplating regulatory changes in response to various climate change interest groups and the potential impact of climate change. Legislation and increased regulation regarding climate change could impose significant costs on us, our venture partners, and our suppliers, including costs related to increased energy requirements, capital equipment, environmental monitoring and reporting, and other costs to comply with such regulations. Any adopted future climate change regulations could also negatively impact our ability to compete with companies situated in areas not subject to such limitations. Given the political significance and uncertainty around the impact of climate change and how it should be dealt with, we cannot predict how legislation and regulation will affect our financial condition, operating performance and ability to compete. Furthermore, even without such regulation, increased awareness and any adverse publicity in the global marketplace about potential impacts on climate change by us or other companies in our industry could harm our reputation.

Common Stock Ownership Risks

We do not intend to pay dividends on our common stock and, consequently, the ability of investors to achieve a return on their investment will depend on appreciation in the price of our common stock.

We do not intend to declare and pay dividends on our common stock for the foreseeable future. The payment of future dividends will be at the discretion of our Board of Directors; however, the indentures and the credit agreements governing our indebtedness place limitations on our ability to pay dividends. We currently intend to invest our future earnings, if any, to reduce our debt and fund our growth and our Board of Directors may choose to provide returns to our stockholders through share repurchases. The success of an investment in our common stock will largely depend upon future appreciation in value, and there can be no guarantee that our common stock will appreciate in value.

Provisions of our certificate of incorporation and bylaws and Delaware law might discourage, delay or prevent a change of control of our company or changes in our management and, as a result, depress the trading price of our common stock.

Our certificate of incorporation and bylaws contain provisions that could discourage, delay or prevent a change in control of our company or changes in our management that the stockholders of our company may deem advantageous. These provisions:

- authorize 1,300,000,000 shares of common stock, which, to the extent unissued, could be issued by the Board of Directors, without stockholder approval, to increase the number of outstanding shares and to discourage a takeover attempt;
- authorize the issuance, without stockholder approval, of blank check preferred stock that our Board of Directors could issue to increase the number of outstanding shares and to discourage a takeover attempt;
- grant to the Board of Directors the sole power to set the number of directors and to fill any vacancy on the Board of Directors;
- limit the ability of stockholders to remove directors only “for cause” and require any such removal to be approved by holders of at least three-quarters of the outstanding shares of common stock;
- prohibit our stockholders from calling a special meeting of stockholders;
- prohibit stockholder action by written consent, which requires all stockholder actions to be taken at a meeting of our stockholders;
- provide that the Board of Directors is expressly authorized to adopt, or to alter or repeal our bylaws;
- establish advance notice and certain information requirements for nominations for election to our Board of Directors or for proposing matters that can be acted upon by stockholders at stockholder meetings;
- establish a classified Board of Directors, with three staggered terms; and
- require the approval of holders of at least three-quarters of the outstanding shares of common stock to amend the bylaws and certain provisions of the certificate of incorporation.

These anti-takeover defenses could discourage, delay or prevent a transaction involving a change in control of our company and may prevent our stockholders from receiving the benefit from any premium to the market price of our common stock offered by a bidder in a takeover context. Even in the absence of a takeover attempt, the existence of these provisions may adversely affect the prevailing market price of our common stock if the provisions are viewed as discouraging takeover attempts in the future. These provisions could also discourage proxy contests and make it more difficult for our stockholders to elect directors of their choosing and cause us to take corporate actions other than those our stockholders may desire.

Our business could be negatively impacted as a result of actions by activist stockholders or others.

Stockholder activism has been increasing in publicly traded companies in recent years and we are subject to the risks associated with such activism, particularly due to the overall decline in our stock price over the last two years. Our business could be negatively affected as a result of stockholder activism, which could cause us to incur significant legal fees and other costs, hinder execution of our business strategy and impact the trading value of our securities. Additionally, stockholder activism could give rise to perceived uncertainties as to our future direction, adversely affect our relationships with key executives and business partners and make it more difficult to attract and retain qualified employees. Any of these impacts could materially and adversely affect our business and operating results.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our facilities are used primarily for manufacturing, distribution and administration. Facilities primarily used for manufacturing may also be used for distribution, engineering, research and development, storage, administration, sales and customer service. Facilities primarily used for administration may also be used for research and development, sales and customer service. As of December 31, 2019, our principal facilities, grouped according to the facility's primary use, were as follows:

Location	Approximate square feet	Principal segments	Owned or leased
Administrative facilities:			
Hickory, NC (1)	84,000	Corporate headquarters	Owned
Joliet, IL (2)	690,000	Corporate	Leased
Horsham, PA	325,000	Corporate	Owned
Suwanee, GA	129,000	Corporate	Leased
San Diego, CA	187,000	N&C and CPE	Leased
Shakopee, MN	177,000	CCS	Leased
Bangalore, India	151,000	CPE and N&C	Leased
Saltaire, UK	147,000	CPE	Leased
Lowell, MA	144,000	N&C	Leased
Santa Clara, CA	132,000	N&C and CPE	Leased
Richardson, TX (1)	100,000	CMS	Owned
Manufacturing and distribution facilities:			
Catawba, NC (1)	1,000,000	CCS	Owned
Claremont, NC (1)	589,000	CCS	Owned
Kessel-Lo, Belgium	431,000	CCS	Owned
Suzhou, China (3)	414,000	CMS	Owned
Suzhou, China (3)	363,000	CCS	Owned
Goa, India	353,000	CMS	Owned
Juarez, Mexico	344,000	CCS	Owned
Santa Teresa, NM	334,000	CCS	Leased
Brno, Czech Republic	281,000	CCS	Leased
Reynosa, Mexico	279,000	CMS	Owned
Veenendaal, Netherlands	215,000	CMS	Leased
Greensboro, NC (1)	196,000	CCS	Owned
Juarez, Mexico	189,000	CCS	Leased
Cary, NC	151,000	CPE & N&C	Owned
Mission, TX	150,000	CMS	Leased
Delicias, Mexico	139,000	CCS	Owned
Campbellfield, Australia	133,000	CMS	Leased
Bray, Ireland	130,000	CCS	Owned
Tijuana, Mexico	128,000	N&C	Leased
Buchdorf, Germany	109,000	CMS	Owned
Vacant facilities and properties:			
Sorocaba, Brazil (4)	157,000	CMS	Owned
Orland Park, IL (1)(5)	—	CMS	Owned

(1) Our interest in each of these properties is encumbered by a mortgage or deed of trust lien securing our senior secured credit facilities (see Note 8 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K).

(2) The former manufacturing portion of the Joliet facility is vacant and is currently being marketed for sublease.

(3) The buildings in these facilities are owned while the land is held under long-term lease agreements.

(4) The Sorocaba, Brazil facility is currently being marketed for sale.

(5) The building at the Orland Park facility was demolished and cleared and the 73 acre parcel is vacant.

We believe that our facilities and equipment generally are well maintained, in good condition and suitable for our purposes and adequate for our present operations. While we currently have excess manufacturing capacity in certain of our facilities, utilization is subject to change based on customer demand. We can give no assurances that we will not have excess manufacturing capacity or encounter capacity constraints over the long term.

ITEM 3. LEGAL PROCEEDINGS

The material set forth under “Commitments and Contingencies” in Note 16 to the Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K is incorporated herein by reference. Management believes none of these legal matters will be material to our business or financial condition upon their final disposition.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

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

Stock Price and Dividends

Our common stock is traded on the Nasdaq Global Select Market under the symbol COMM. As of February 7, 2020, all of our outstanding shares of common stock are held by one stockholder of record, Cede & Co., as nominee for the Depository Trust Company. Many brokers, banks and other institutions hold shares of common stock as nominees for beneficial owners that deposit these shares of common stock in participant accounts at the Depository Trust Company.

Issuer Purchases of Equity Securities

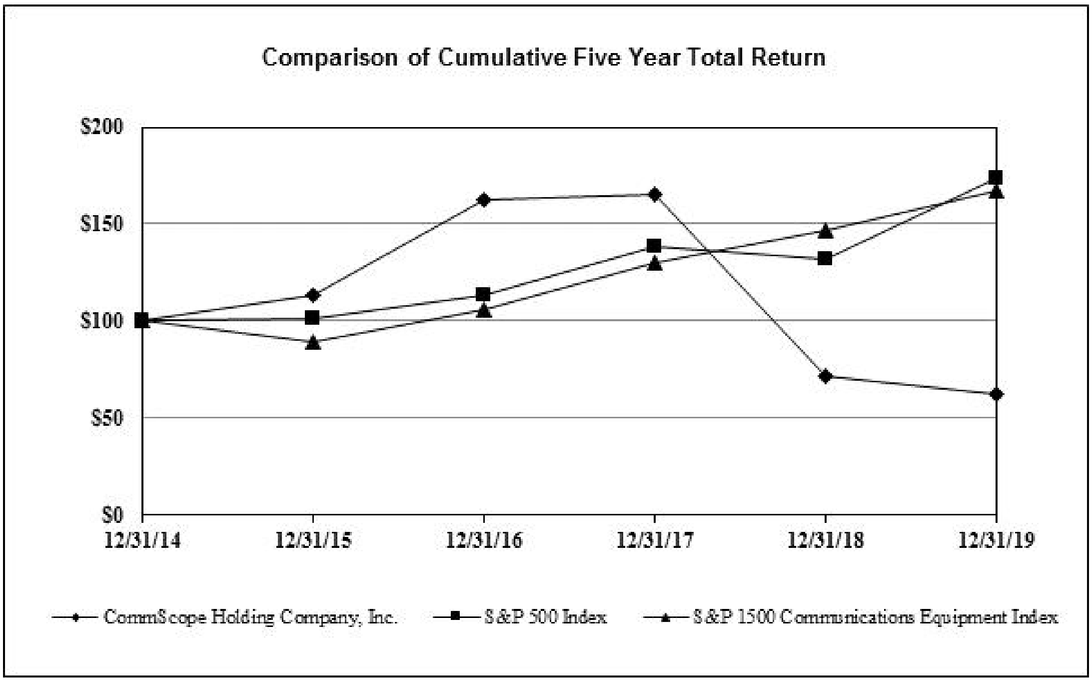
The following table summarizes the stock purchase activity for the three months ended December 31, 2019:

Period	Total Number of Shares Purchased (1)	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Maximum Value of Shares that May Yet be Purchased Under the Plans or Programs
October 1, 2019 - October 31, 2019	7,153	$ 11.88	—	$ —
November 1, 2019 - November 30, 2019	9,836	$ 13.56	—	$ —
December 1, 2019 - December 31, 2019	48,599	$ 13.42	—	$ —
Total	65,588	$ 13.27	—	

(1) The shares purchased were withheld to satisfy the withholding tax obligations related to restricted stock units and performance share units that vested during the period.

Stock Performance Graph

The following graph compares cumulative total return on $100 invested on December 31, 2014 in each of CommScope's Common Stock, the Standard & Poor's 500 Stock Index (S&P 500 Index) and the Standard & Poor's 1500 Communications Equipment Index (S&P 1500 Communications Equipment). The return of the Standard & Poor's indices is calculated assuming reinvestment of dividends. CommScope has not paid any dividends on its common stock over this period.



Company / Index	Base Period 12/31/2014	INDEXED RETURNS Period Ending 12/31/2015	12/31/2016	12/31/2017	12/31/2018	12/31/2019
CommScope Holding Company, Inc.	100	113.40	162.94	165.70	71.79	62.16
S&P 500 Index	100	101.38	113.51	138.29	132.23	173.86
S&P 1500 Communications Equipment Index	100	88.81	106.32	130.20	146.56	167.31

ITEM 6. SELECTED FINANCIAL DATA

The following table presents our historical selected financial data as of the dates and for the periods indicated. The data for each of the years presented are derived from our audited consolidated financial statements. The information set forth below should be read in conjunction with our audited consolidated financial statements and notes thereto and Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" of this Annual Report.

Five-Year Summary of Selected Financial Data
(In millions, except per share amounts)

	Year Ended December 31,				
	2019	2018	2017	2016	2015
Results of Operations:					
Net sales	$ 8,345.1	$ 4,568.5	$ 4,560.6	$ 4,923.6	$ 3,807.8
Gross profit (1)	2,404.1	1,633.3	1,705.5	1,973.1	1,309.4
Restructuring costs, net	87.7	44.0	43.8	42.9	29.5
Asset impairments	376.1	15.0	—	38.6	90.8
Operating income (loss)	(508.5)	450.0	472.0	567.6	169.6
Net interest expense	(559.1)	(235.0)	(252.8)	(272.0)	(230.5)
Net income (loss)	(929.5)	140.2	193.8	222.8	(70.9)
Series A convertible preferred stock dividends	(43.7)	—	—	—	—
Net income (loss) attributable to common stockholders	(973.2)	140.2	193.8	222.8	(70.9)
Earnings (Loss) Per Share Information:					
Weighted average number of shares outstanding:					
Basic	193.7	192.0	192.4	192.5	189.9
Diluted	193.7	195.3	196.8	196.5	189.9
Earnings (loss) per share:					
Basic	$ (5.02)	$ 0.73	$ 1.01	$ 1.16	$ (0.37)
Diluted	$ (5.02)	$ 0.72	$ 0.98	$ 1.13	$ (0.37)
Other Information:					
Net cash generated by operating activities	596.4	494.1	586.3	640.2	327.1
Depreciation and amortization	770.9	357.5	378.0	399.1	303.5
Additions to property, plant and equipment	104.1	82.3	68.7	68.3	56.5

	As of December 31,				
	2019	2018	2017	2016	2015
Balance Sheet Data:					
Cash and cash equivalents	$ 598.2	$ 458.2	$ 454.0	$ 428.2	$ 562.9
Goodwill and intangible assets	9,735.3	4,204.3	4,522.7	4,567.4	4,838.1
Property, plant and equipment, net	723.8	450.9	467.3	475.0	528.7
Total assets	14,431.6	6,630.5	7,041.7	7,142.0	7,502.6
Working capital	1,469.8	1,187.2	1,220.1	1,135.9	1,319.5
Long-term debt, including current maturities	9,832.4	3,985.9	4,369.4	4,562.0	5,243.7
Series A convertible preferred stock	1,000.0	—	—	—	—
Stockholders' equity	836.3	1,756.8	1,647.9	1,394.1	1,222.7

(1) Effective April 1, 2019, we made a voluntary change in accounting principle that reclassifies internal handling costs to prepare goods for shipment from selling, general and administrative expense to cost of sales. The accounting policy change was applied retrospectively to the periods presented.

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

The following discussion and analysis of our financial condition and results of operations is for the year ended December 31, 2019 compared with the year ended December 31, 2018. This comparison should be read in conjunction with our consolidated financial statements and related notes appearing elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements based upon current expectations that involve risks and uncertainties. Our actual results may differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth under "Risk Factors" included in Part I, Item 1A or in other parts of this Annual Report on Form 10-K. For a discussion and analysis of our financial condition and results of operations for the year ended December 31, 2018 compared to December 31, 2017, see Part II, Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in the 2018 Annual Report on Form 10-K, filed with the Securities and Exchange Commission on February 21, 2019.

OVERVIEW

We are a global provider of infrastructure solutions for communication and entertainment networks. Our solutions for wired and wireless networks enable service providers including cable, telephone and digital broadcast satellite operators and media programmers to deliver media, voice, Internet Protocol (IP) data services and Wi-Fi to their subscribers and allow enterprises to experience constant wireless and wired connectivity across complex and varied networking environments. Our solutions are complemented by a broad array of services including technical support, systems design and integration. We are a leader in digital video and IP television distribution systems, broadband access infrastructure platforms and equipment that delivers data and voice networks to homes. Our global leadership position is built upon innovative technology, broad solution offerings, high-quality and cost-effective customer solutions, and global manufacturing and distribution scale.

On April 4, 2019, we completed the acquisition of ARRIS International plc (ARRIS) (the Acquisition) in an all-cash transaction with a total purchase price of approximately $7.7 billion, including debt assumed. The combined company is expected to drive profitable growth in new markets, shape the future of wired and wireless communications, and be in a position to benefit from key industry trends, including network convergence, fiber and mobility everywhere, 5G, Internet of Things (IoT) and rapidly changing network and technology architectures. The operations of ARRIS are included in our consolidated operating results for the year ended December 31, 2019 from the date of the Acquisition, April 4, 2019.

Prior to the Acquisition, we operated and reported based on two operating segments: Connectivity Solutions (Connectivity) and Mobility Solutions (Mobility). Following the Acquisition, we have operated and managed CommScope in the following reportable segments: Connectivity, Mobility, Customer Premises Equipment (CPE), Network & Cloud (N&C) and Ruckus Networks (Ruckus). We recently announced a realignment of our operating structure that became effective in January 2020. Based on this new operating structure, our new segments are Venue and Campus Networks, Broadband Networks, Outdoor Wireless Networks and Home Networks. We will begin reporting based on these segments in the first quarter of 2020.

To fund the Acquisition, in February 2019, we issued $1.25 billion of 5.50% senior secured notes due 2024 (the 2024 Secured Notes), $1.5 billion of 6.00% senior secured notes due 2026 (the 2026 Secured Notes) and $1.0 billion of 8.25% senior unsecured notes due 2027 (the New Unsecured Notes and, together with the 2024 Secured Notes and the 2026 Secured Notes, the New Notes), the proceeds from which were released from escrow on the date of the Acquisition. On the date of the Acquisition, we borrowed $3.2 billion under a new senior secured term loan due 2026 (the 2026 Term Loan) with an interest rate of LIBOR plus 3.25% and entered into a new asset-based revolving credit facility in an amount up to $1.0 billion with availability of $796.8 million as of December 31, 2019, reflecting a borrowing base of $820.9 million reduced by $24.1 million of letters of credit under the facility. Also as of April 4, 2019, we issued $1.0 billion in Series A Convertible Preferred Stock (the Convertible Preferred Stock) to Carlyle Partners VII S1 Holdings, L.P. (Carlyle). During the year ended December 31, 2019, we recognized $195.3 million of transaction and integration costs primarily related to the Acquisition. We will continue to incur transaction and integration costs as well as restructuring costs to integrate the ARRIS business and those costs may be material.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

Our consolidated financial statements have been prepared in conformity with generally accepted accounting principles (GAAP) in the United States (U.S.). The preparation of these financial statements requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. These estimates and their underlying assumptions form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other objective sources. Management bases its estimates on historical experience and on assumptions that are believed to be reasonable under the circumstances and revises its estimates, as appropriate, when changes in events or circumstances indicate that revisions may be necessary.

The following critical accounting policies and estimates reflected in our financial statements are based on management’s knowledge of and experience with past and current events and on management’s assumptions about future events. While we have generally not experienced significant deviations from our critical estimates in the past, it is reasonably possible that these estimates may ultimately differ materially from actual results. See Note 2 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K for a description of all of our significant accounting policies.

Business Combinations

We use the acquisition method of accounting for business combinations which requires the tangible and intangible assets acquired and liabilities assumed to be recorded at their respective fair market value as of the acquisition date. Goodwill represents the excess of the consideration transferred over the fair value of the net assets acquired. The fair values of the assets acquired and liabilities assumed are determined based upon management’s valuation and involves making significant estimates and assumptions based on facts and circumstances that existed as of the acquisition date. We use a measurement period following the acquisition date to gather information that existed as of the acquisition date that is needed to determine the fair value of the assets acquired and liabilities assumed. The measurement period ends once all information is obtained, but no later than one year from the acquisition date.

Asset Impairment Reviews

Impairment Reviews of Goodwill

We test goodwill at the reporting unit level for impairment annually as of October 1 and on an interim basis when events occur or circumstances exist that indicate the carrying value may no longer be recoverable. As of January 1, 2019, we early adopted Accounting Standards Update (ASU) 2017-04, *Intangibles - Goodwill and Other (Topic 350) - Simplifying the Test for Goodwill Impairment*, which eliminated Step 2 of the goodwill impairment test. Step 2 required an entity to determine the fair value at the impairment testing date of its assets and liabilities. The standard does not change the guidance on completing Step 1 of the goodwill impairment test. In accordance with the new standard, we compare the fair value of our reporting units with the carrying amount, including goodwill. We recognize an impairment charge for the amount by which the reporting unit’s carrying amount exceeds its fair value.

We estimate the fair value of a reporting unit using a discounted cash flow (DCF) method or, as appropriate, a combination of the DCF method and a market approach known as the guideline public company method. Under the DCF method, we calculate the fair value of a reporting unit based on the present value of estimated future cash flows. The significant assumptions in the DCF model primarily include, but are not limited to, forecasts of annual revenue growth rates, annual operating income margin, the terminal growth rate and the discount rate used to determine the present value of the cash flow projections. When determining these assumptions and preparing these estimates, we consider historical performance trends, industry data, insight derived from customers, relevant changes in the reporting unit’s underlying business and other market trends that may affect the reporting unit. The discount rate is based on the estimated weighted average cost of capital as of the test date of market participants in the industry in which the reporting unit operates. Under the guideline public company method, we estimate the fair value based upon market multiples of revenue and earnings derived from publicly traded companies with similar operating and investment characteristics as the reporting unit. The weighting of the fair value derived from the market approach may vary depending on the level of comparability of these publicly-traded companies to the reporting unit. When comparable public companies are not meaningful or not available, we may estimate the fair value of a reporting unit using only the DCF method.

Estimating the fair value of a reporting unit involves uncertainties because it requires management to develop numerous assumptions, including assumptions about the future growth and potential volatility in revenues and costs, capital expenditures, industry economic factors and future business strategy. Changes in projected revenue growth rates, projected operating income margins or estimated discount rates due to uncertain market conditions, loss of one or more key customers, changes in our strategy, changes in technology or other factors could negatively affect the fair value in one or more of our reporting units and result in a material impairment charge in the future.

To assess the reasonableness of the calculated fair values of our reporting units, we also compare the sum of the reporting units' fair values to our market capitalization and calculate an implied control premium (the excess of the sum of the reporting units' fair values over the market capitalization). If the implied control premium is not reasonable, we will reevaluate the fair value estimates of the reporting unit by adjusting the discount rates and/or other assumptions.

2019 Interim Goodwill Analysis

During the second quarter of 2019, management determined that indicators of possible goodwill impairment existed for the reporting units from the recently acquired ARRIS business. Since the closing of the Acquisition at the beginning of the second quarter of 2019, the ARRIS reporting units (CPE, N&C and Ruckus) had continued to experience challenges that impacted our performance. The challenges included declines in spending by our cable operator customers that resulted in declines in revenue and operating income for these reporting units and the loss of key leaders of these reporting units following the Acquisition. Certain of these challenges were expected to persist throughout the remainder of 2019 and impact management's ability to grow these businesses at the rate that was originally estimated when we completed the acquisition of ARRIS. Based on these indicators, a goodwill impairment test was performed for these reporting units using a DCF valuation model. Given the proximity to the acquisition date, we did not use a market approach for the interim goodwill test. The discount rates used in the second quarter 2019 interim goodwill impairment test were 9.5%, 10.5% and 11.0% for the CPE, N&C and Ruckus reporting units. As a result, management developed a revised forecast for 2019 and updated the annual financial forecasts for the years beyond 2019 that consider these challenges. The projections assumed a recovery of spending by these customers would begin in 2020. The extent and timing of this recovery were key assumptions in the determination of the fair value of the reporting units. The second quarter 2019 impairment test showed no impairment.

2019 Annual Goodwill Analysis

The annual test of goodwill was performed for each of the reporting units with goodwill balances as of October 1, 2019. As a result of the annual test, we recorded goodwill impairment charges totaling $376.1 million, of which $192.8 million related to our CPE reporting unit, $142.1 million related to our N&C reporting unit and $41.2 million related to our Ruckus reporting unit. These reporting units were acquired in our ARRIS acquisition on April 4, 2019. Since the closing of the Acquisition, the ARRIS reporting units have experienced challenges that impacted our performance. These challenges included declines in spending by cable operator customers that resulted in declines in net sales and operating income for these reporting units and the loss of key leaders of these reporting units following the Acquisition. Initially, we anticipated a recovery in spending by certain customers starting in 2020. During our annual strategic planning process in the fourth quarter of 2019, a number of specific factors arose, including an assessment of historical and future operating results, key customer inputs, new assessments of market trends and anticipated expenditures required to support the changing market dynamics affecting each of the reporting units. As a result of these factors, we expect a more prolonged recovery and have concluded that the fair value of each of the ARRIS reporting units was less than its carrying value, which resulted in a partial write-off of goodwill for each of the reporting units as of October 1, 2019. The expense was recorded in the asset impairments line on the Consolidated Statement of Operations.

For the 2019 annual goodwill test, we determined the fair value of each reporting unit using a DCF model and a guideline public company approach, with 75% of the value determined using the DCF model and 25% of the value determined using the market approach.

As discussed, our CPE, N&C and Ruckus reporting units failed the annual goodwill impairment test and an impairment was recorded as of October 1, 2019. Our distributed coverage and capacity systems (DCCS) reporting unit was also at risk of failing the goodwill impairment test as the amount by which its fair value exceeded its carrying value was less than 10%. The DCCS reporting unit is in our Mobility segment. Considering the relatively low headroom going forward for the CPE, N&C, Ruckus and DCCS reporting units, there is a risk for future impairment in the event of decline in general economic, market or business conditions or any significant unfavorable change in the forecasted cash flows, weighted average cost of capital and growth rates. If current and long-term projections for our CPE, N&C, Ruckus and DCCS reporting units are not realized or decrease materially, we may be required to recognize additional goodwill impairment charges.

The following table sets forth summary information regarding our CPE, N&C, Ruckus and DCCS reporting units as of December 31, 2019, including key assumptions used in our annual goodwill analysis, along with sensitivity analysis showing the effect of a change in certain key assumptions, assuming all other assumptions remain constant, to the resulting fair value using an income approach, as of October 1, 2019:

	Key Assumptions		Goodwill		Excess (Deficit) of Fair Value to Carrying Value			
Reporting Unit	Discount Rate	Terminal Growth Rate	Balance at December 31, 2019	Percent of Total Assets	Result of Annual Goodwill Test as of October 1, 2019	Decrease of 10% in Cash Flows	Decrease of 0.5% in Long-term Growth Rate	Increase of 0.5% in Discount Rate
			(dollars in millions)					
CPE	9.0 %	0.0 %	$ 209.3	1.5%	$ (192.8)	$ (354.9)	$ (236.8)	$ (283.1)
N&C	10.0 %	2.0 %	2,029.1	14.1%	(142.1)	(433.5)	(194.9)	(289.1)
Ruckus	11.0 %	3.0 %	375.8	2.6%	(41.2)	(117.4)	(78.1)	(107.1)
DCCS	9.5 %	2.0 %	235.3	1.6%	44.2	(24.8)	(2.7)	(17.2)

Definite-Lived Intangible Assets and Other Long-Lived Assets

Management reviews definite-lived intangible assets and other long-lived assets for impairment when events or changes in circumstances indicate that their carrying values may not be fully recoverable. This analysis differs from our goodwill impairment analysis in that an intangible or other long-lived asset impairment is only deemed to have occurred if the sum of the forecasted undiscounted future net cash flows related to the assets being evaluated is less than the carrying value of the assets. If the forecasted net cash flows are less than the carrying value, then the asset is written down to its estimated fair value. We did not identify any impairments of definite-lived intangible assets or other long-lived assets in 2019. Changes in the estimates of forecasted net cash flows may result in future asset impairments that could be material to our results of operations.

Revenue Recognition

We recognize revenue based on the satisfaction of distinct obligations to transfer goods and services to customers. Our revenue is generated primarily from product or equipment sales. We also generate revenue from custom design and installation services as well as bundled sales arrangements that include product, software and services. Revenue is recognized when performance obligations in a contract are satisfied through the transfer of control of the good or service at the amount of consideration expected to be received. The following are required before revenue is recognized:

- Identify the contract with the customer. A variety of arrangements are considered contracts; however, contracts typically take the form of a master purchase agreement or customer purchase orders.
- Identify the performance obligations in the contract. Performance obligations are identified as promised goods or services that are distinct within an arrangement.
- Determine the transaction price. The transaction price is the amount of consideration we expect to receive in exchange for transferring the promised goods or services. The consideration may include fixed or variable amounts or both.
- Allocate the transaction price to the performance obligations. The transaction price is allocated to the performance obligations on a relative standalone selling price basis.

- Recognize revenue as the performance obligations are satisfied. Revenue is recognized when transfer of control of the promised goods or services has occurred. This is either at a point in time or over time.

Product sales represent over 90% of our revenue. For these sales, revenue is recognized when control of the product has transferred to the customer, which is generally at the point in time when products have been shipped, right to payment has been obtained and risk of loss has been transferred. Certain of our product performance obligations include proprietary operating system software, which typically is not considered separately identifiable. Therefore, sales of these products and the related software are considered one performance obligation.

License contracts include revenue recognized for the licensing of intellectual property, including software, sold separately without products. Functional intellectual property licenses do not meet the criteria for revenue to be recognized over time and revenue is most commonly recognized upon delivery of the license/software to the customer.

Certain customer transactions may be project based and include multiple performance obligations based on the bundling of equipment, software and services. When a multiple performance obligation arrangement exists, the transaction price is allocated to the performance obligations based on the relative standalone selling price, and revenue is recognized upon transfer of control of each deliverable. To determine the standalone selling price, we first look to establish the standalone selling price through an observable price when the good or service is sold separately in similar circumstances. If the standalone selling price cannot be established through an observable price, we will make an estimate based on market conditions, customer specific factors and customer class. We may use a combination of approaches to estimate the standalone selling price.

For performance obligations recognized over time, judgment is required to evaluate assumptions, including the total estimated costs to determine progress towards completion of the performance obligation and to calculate the corresponding amount of revenue to recognize. If estimated total costs on any contract are greater than the net contract revenues, the entire estimated costs are recorded in the period in which the revisions to estimates are identified and the amounts can be reasonably estimated.

Other customer contract types include a variety of post-contract support services offerings, including:

- Maintenance and support services provided under annual service-level agreements with our customers. These services represent stand-ready obligations that are recognized over time (on a straight-line basis over the contract period) because the customer simultaneously receives and consumes the benefits of the services as the services are performed.
- Professional services and other similar services consist primarily of “Day 2” services to help customers maximize their utilization of deployed systems. The services are recognized over time because the customer simultaneously receives and consumes the benefits of the service as the services are performed.
- Installation services relate to the routine installation of equipment ordered by the customer at the customer’s site and are distinct performance obligations from delivery of the related hardware. The associated revenues are recognized over time as the services are provided.

Revenue is measured based on the consideration to which we expect to be entitled based on customer contracts. For sales to distributors, system integrators and value-added resellers, revenue is adjusted for variable consideration amounts, including but not limited to estimated discounts, returns, rebates and distributor price protection programs. These estimates are determined based upon historical experience, contract terms, inventory levels in the distributor channel and other related factors. Adjustments to variable consideration estimates are recorded when circumstances indicate revisions may be necessary.

A contract liability for deferred revenue is recorded when consideration is received or is unconditionally due from a customer prior to transferring control of goods or services to the customer under the terms of a contract. Deferred revenue balances typically result from advance payments received from customers for product contracts or from billings in excess of revenue recognized on project or services arrangements.

Unbilled receivables are recorded when revenues are recognized in advance of invoice issuance. A contract asset is any portion of unbilled receivables for which the right to consideration is conditional on a factor other than the passage of time, which is common for certain project contract performance obligations. These assets are presented on a combined basis with accounts receivable and are converted to accounts receivable once our right to the consideration becomes unconditional, which varies by contract but is generally based on achieving certain acceptance milestones. We recognize the incremental costs of obtaining a contract as an expense when incurred if the amortization period of the asset would be one year or less.

We include shipping and handling costs billed to customers in net sales and include the costs incurred to transport product to customers as well as certain internal handling costs, which relate to activities to prepare goods for shipment, as cost of sales. Shipping and handling costs incurred after control is transferred to the customer are accounted for as fulfillment costs and are not accounted for as separate revenue obligations.

Leases

We determine if a contract is a lease or contains a lease at inception. Right of use assets related to operating type leases are reported in other noncurrent assets and the present value of remaining lease obligations is reported in accrued and other liabilities and other noncurrent liabilities on the Consolidated Balance Sheets. We do not currently have any financing type leases.

Operating lease liabilities are recognized based on the present value of the future minimum lease payments over the lease term at commencement date. The majority of our leases do not provide an implicit rate; therefore, we use the incremental borrowing rates applicable to the economic environment and the duration of the lease, based on the information available at commencement date, in determining the present value of future payments. The right of use asset for operating leases is measured using the lease liability adjusted for the impact of lease payments made prior to commencement, lease incentives received, initial direct costs incurred and any asset impairments. Lease terms may include options to extend or terminate the lease when it is reasonably certain that the option will be exercised. Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term.

We remeasure and reallocate the consideration in a lease when there is a modification of the lease that is not accounted for as a separate contract. The lease liability is remeasured when there is a change in the lease term or a change in the assessment of whether we will exercise a lease option. We assess right of use assets for impairment in accordance with our long-lived asset impairment policy.

We account for lease agreements with contractually required lease and non-lease components on a combined basis. Lease payments made for cancellable leases, variable amounts that are not based on an observable index and lease agreements with an original duration of less than twelve months are recorded directly to lease expense.

Inventory Reserves

We maintain reserves to reduce the value of inventory based on the lower of cost or net realizable value, including allowances for excess and obsolete inventory. These reserves are based on management’s assumptions about and analysis of relevant factors including current levels of orders and backlog, forecasted demand, market conditions and new products or innovations that diminish the value of existing inventories. If actual market conditions deteriorate from those anticipated by management, additional allowances for excess and obsolete inventory could be required and may be material to earnings.

Product Warranty Reserves

We recognize a liability for the estimated claims that may be paid under our customer assurance-type warranty agreements to remedy potential deficiencies of quality or performance of our products. The product warranties extend over various periods, depending upon the product subject to the warranty and the terms of the individual agreements. We record a provision for estimated future warranty claims based upon the historical relationship of warranty claims to sales and specifically identified warranty issues. We base our estimates on historical experience and on assumptions that are believed to be reasonable under the circumstances and revise our estimates, as appropriate, when events or changes in circumstances indicate that revisions may be necessary. Although these estimates are based on management’s knowledge of and experience with past and current events and on management’s assumptions about future events, it is reasonably possible that they may ultimately differ materially from actual results, including in the case of a significant product failure.

Tax Valuation Allowances and Liabilities for Unrecognized Tax Benefits

We establish an income tax valuation allowance when available evidence indicates that it is more likely than not that all or a portion of a deferred tax asset will not be realized. In assessing the need for a valuation allowance, we consider the amounts, character, source and timing of expected future deductions or carryforwards as well as sources of taxable income and tax planning strategies that may enable utilization. We maintain an existing valuation allowance until sufficient positive evidence exists to support its reversal. Changes in the amount or timing of expected future deductions or taxable income may have a material impact on the level of income tax valuation allowances. If we determine that we will not be able to realize all or part of a deferred tax asset in the future, an increase to an income tax valuation allowance would be charged to earnings in the period such determination was made.

We recognize income tax benefits related to particular tax positions only when it is considered more likely than not that the tax position will be sustained if examined on its technical merits by tax authorities. The amount of benefit recognized is the largest amount of tax benefit that is evaluated to be greater than 50% likely to be realized. Considerable judgment is required to evaluate the technical merits of various positions and to evaluate the likely amount of benefit to be realized. Lapses in statutes of limitations, developments in tax laws, regulations and interpretations, and changes in assessments of the likely outcome of uncertain tax positions could have a material impact on the overall tax provision.

We establish deferred tax liabilities for the estimated tax cost associated with foreign earnings that we do not consider permanently reinvested (primarily foreign withholding and state income taxes). These liabilities are subject to adjustment if there is a change in the assertion of whether the foreign earnings are considered to be permanently reinvested.

We also establish allowances related to value-added and similar recoverable taxes when it is considered probable that those assets are not recoverable. Changes in the probability of recovery or in the estimates of the amount recoverable are recognized in the period such determination is made and may be material to earnings.

RESULTS OF OPERATIONS

Comparison of results of operations for the year ended December 31, 2019 with the year ended December 31, 2018

	Year Ended December 31, 2019 Amount	2019 % of Net Sales	2018 Amount	2018 % of Net Sales	$ Change	% Change
	(dollars in millions, except per share amounts)					
Net sales	$ 8,345.1	100.0%	$ 4,568.5	100.0%	$ 3,776.6	82.7%
Gross profit	2,404.1	28.8	1,633.3	35.8	770.8	47.2
Operating income (loss)	(508.5)	(6.1)	450.0	9.9	(958.5)	(213.0)
Non-GAAP adjusted operating income (1)	1,153.8	13.8	838.0	18.3	315.8	37.7
Non-GAAP adjusted EBITDA (1)	1,297.5	15.5	913.6	20.0	383.9	42.0
Net income (loss)	(929.5)	(11.1)	140.2	3.1	(1,069.7)	(763.0)
Net income (loss) attributable to common stockholders	(973.2)	(11.7)	140.2	3.1	(1,113.4)	(794.2)
Diluted earnings (loss) per share	$ (5.02)		$ 0.72		$ (5.74)	(797.2)

(1) See "Reconciliation of Non-GAAP Measures" in this Management's Discussion and Analysis of Financial Condition and Results of Operations, below.

Net sales

	Year Ended December 31, 2019	2018	$ Change	% Change
	(dollars in millions)			
Net sales	$ 8,345.1	$ 4,568.5	$ 3,776.6	82.7%
Domestic net sales	4,922.2	2,539.2	2,383.0	93.8
International net sales	3,422.9	2,029.3	1,393.6	68.7

Net sales for the year ended December 31, 2019 included ARRIS net sales of $4.0 billion. Excluding the ARRIS business, CommScope's net sales were lower for 2019 compared to the prior year. Approximately 50% of the decline related to lower volumes, approximately 35% related to pricing pressures and the remainder related to impacts of foreign exchange rate changes among other factors. From a regional perspective, we saw lower net sales across all regions for 2019. For 2019, the decrease in net sales excluding the ARRIS business was primarily driven by declines of $166.6 million in the Asia Pacific (APAC) region and $41.0 million in the Europe, Middle East and Africa (EMEA) region.

Net sales to customers located outside of the U.S. comprised 41.0% of total net sales for 2019 compared to 44.4% for 2018. For further details by segment, see the section titled "Segment Results" below.

Gross profit, SG&A expense and R&D expense

	Year Ended December 31, 2019	2018	$ Change	% Change
	(dollars in millions)			
Gross profit	$ 2,404.1	$ 1,633.3	$ 770.8	47.2%
As a percent of sales	28.8%	35.8%		
SG&A expense	1,277.1	674.0	603.1	89.5
As a percent of sales	15.3%	14.8%		
R&D expense	578.5	185.7	392.8	211.5
As a percent of sales	6.9%	4.1%		

Gross profit (net sales less cost of sales)

Gross profit for 2019 was negatively affected by ARRIS acquisition accounting adjustments of $264.2 million primarily related to the markup of inventory to its estimated fair value less the estimated costs associated with its sale. Excluding the acquisition accounting adjustments recorded in 2019, gross profit for CommScope was $2.7 billion and gross profit as a percentage of sales was 32.0%. Excluding the ARRIS business in total, for 2019, CommScope's gross profit was $1.5 billion and gross profit as a percentage of sales was 34.8%. For 2019, gross profit and gross profit as a percentage of sales for the legacy CommScope business decreased due to lower net sales and the $55.0 million settlement of patent infringement litigation as described in Note 16 in the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

The Connectivity segment experienced lower gross profit in 2019 compared to the prior year primarily as a result of the $255.3 million decrease in net sales. The Mobility segment's gross profit was essentially unchanged compared to the prior year despite the $55.0 million patent infringement litigation settlement.

As discussed in Note 2 in the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K, we changed our accounting principle to reclassify certain internal handling costs from selling, general and administrative (SG&A) expense to cost of sales. The impact of this change increased cost of sales and decreased gross profit by $55.0 million for 2018. All comparisons presented in this management's discussion and analysis have been adjusted to reflect the impact of this change in accounting principle.

Selling, general and administrative expense

For 2019, SG&A expense increased primarily due to the inclusion of ARRIS SG&A expense (excluding transaction and integration costs) of $445.8 million and transaction and integration costs of $195.3 million. Excluding the ARRIS business as well as transaction and integration costs, SG&A expense decreased $18.5 million for 2019, compared to the prior year primarily due to benefits from cost savings initiatives. Excluding transaction and integration costs and the ARRIS business, SG&A expense as a percentage of sales was 14.8% for 2019.

Research and development expense

Research and development (R&D) expense increased for 2019 compared to the prior year due to the inclusion of ARRIS R&D expenses of $385.7 million. Excluding ARRIS, R&D expense for CommScope increased by $7.1 million primarily due to our continuing investment in Mobility segment products. R&D activities generally relate to ensuring that our products are capable of meeting the evolving technological needs of our customers, bringing new products to market and modifying existing products to better serve our customers.

Amortization of purchased intangible assets, Restructuring costs, net and Asset impairments

	Year Ended December 31,		$
	2019	2018	Change
	(dollars in millions)		
Amortization of purchased intangible assets	$ 593.2	$ 264.6	$ 328.6
Restructuring costs, net	87.7	44.0	43.7
Asset impairments	376.1	15.0	361.1

Amortization of purchased intangible assets

The amortization of purchased intangible assets was higher in 2019 compared to the prior year primarily due to the additional amortization resulting from the Acquisition. Excluding ARRIS, amortization related to CommScope was lower by $32.0 million for 2019 compared to the prior year because certain of our intangible assets became fully amortized.

Restructuring costs, net

The restructuring costs recorded in 2019 were primarily related to integrating the ARRIS business while the restructuring costs recognized in the prior year were primarily related to the integration of the BNS business. From a cash perspective, we paid $89.9 million to settle restructuring liabilities during 2019 and expect to pay an additional $23.9 million by the end of 2020 related to restructuring actions that have been initiated. In addition, we expect to pay $4.4 million between 2021 and 2022 related to restructuring actions that have been initiated. No significant restructuring charges are expected to be incurred to complete the previously announced BNS integration initiatives. Additional restructuring actions related to the acquisition of ARRIS are expected to be identified and the resulting charges and cash requirements are expected to be material.

Asset impairments

During 2019 we recorded goodwill impairment charges of $192.8 million, $142.1 million and $41.2 million related to our CPE, N&C and Ruckus segments, respectively, as a result of our annual impairment test. During 2018, we recorded an impairment charge of $15.0 million allocated equally between the Connectivity and Mobility segments to fully impair an equity investment in a privately-held company.

Other expense, net

	Year Ended December 31, 2019	Year Ended December 31, 2018	$ Change
	(dollars in millions)		
Foreign currency loss	$ (11.9)	$ (29.9)	$ 18.0
Other income (expense), net	5.5	(14.4)	19.9

Foreign currency loss

Foreign currency loss includes the net foreign currency gains and losses resulting from the settlement of receivables and payables, foreign currency contracts and short-term intercompany advances in a currency other than the subsidiary's functional currency. The decrease in 2019 was driven by a $14.0 million foreign currency loss in 2018 that was related to foreign currency translation adjustments previously reported in accumulated other comprehensive loss that were recognized in other expense, net due to the liquidation of a foreign subsidiary.

Other income (expense), net

The decrease in other expense, net for 2019 compared to the prior year was primarily due the impact in 2018 of the termination of a U.S. defined benefit pension plan and the termination of benefits under certain of our U.S. postretirement medical plans. As a result of the pension plan terminations, we recognized a pretax charge of $34.5 million in 2018 related to unrecognized net actuarial losses previously recorded in accumulated other comprehensive loss. We also recognized a pretax gain of $9.7 million related to unrecognized prior service credits and unrecognized net actuarial gains previously recorded in accumulated other comprehensive loss for the postretirement medical plans. Other income, net for 2019 includes gains of $6.1 million related to the sale of certain investments.

Interest expense, Interest income and Income taxes

	Year Ended December 31, 2019	Year Ended December 31, 2018	$ Change
	(dollars in millions)		
Interest expense	$ (577.2)	$ (242.0)	$ (335.2)
Interest income	18.1	7.0	11.1
Income tax (expense) benefit	144.5	(30.5)	175.0

Interest expense and interest income

Interest expense for 2019 increased compared to the prior year due to the financing of the Acquisition. In February 2019, we issued the New Notes, which were held in escrow until the Acquisition date, April 4, 2019. In February 2019, we also secured the borrowing of $3.2 billion, less $32.0 million of original issue discount, under the 2026 Term Loan which was funded on April 4, 2019 as well. We began accruing interest on the New Notes in February 2019 and accrued ticking fees related to the 2026 Term Loan from February 2019 to April 2019. We incurred $379.2 million of incremental interest expense during 2019 as a result of this acquisition-related debt.

We used the proceeds from the New Notes and a portion of the 2026 Term Loan, together with cash on hand and proceeds from the issuance of the Convertible Preferred Stock to finance the Acquisition. The remaining proceeds from the 2026 Term Loan were used to pay off the existing senior secured term loan due 2022 (the 2022 Term Loan). We also made voluntary payments on the 2022 Term Loan during 2019. In connection with the repayments of the 2022 Term Loan, $7.7 million of original issue discount and debt issuance costs were written off and included in interest expense in 2019. During 2019, we also redeemed $500.0 million aggregate principal amount of our 5.00% senior notes due 2021 (the 2021 Notes) and accelerated the recognition of $2.1 million of debt issuance costs in interest expense.

Our weighted average effective interest rate on outstanding borrowings, including the amortization of debt issuance costs and original issue discount, was 6.13% at December 31, 2019 and 5.73% at December 31, 2018.

Interest income increased during 2019 due to $10.9 million of interest earned on the proceeds of the New Notes that were held in an interest-bearing escrow account until the Acquisition date.

In March 2019, we entered into pay-fixed, receive-variable interest rate swap derivatives and designated them as cash flow hedges of interest rate risk. These swaps effectively fixed the interest rate on a portion the 2026 Term Loan. The total notional amount of the interest rate swap derivatives as of December 31, 2019 was $600 million with outstanding maturities of up to fifty-one months.

Income tax (expense) benefit

For 2019, our effective tax rate was 13.5% and we recognized a tax benefit of $144.5 million on a pretax loss of $1,074.0 million. The unfavorable impact to our tax benefit was driven primarily by $77.9 million related to goodwill impairment charges for which minimal tax benefits were recorded. The rate was also unfavorably impacted by U.S. anti-deferral provisions and foreign withholding taxes but these were partially offset by the favorable impact of federal tax credits and the expiration of statutes of limitations on various uncertain tax positions. The impact of excess tax costs related to equity-based compensation awards was not material in 2019. See Note 13 Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for more discussion of our income tax benefit.

The effective income tax rate of 17.9% for 2018 was lower than the statutory rate of 21.0% primarily due to a reduction in tax expense of $23.3 million related to the expiration of statutes of limitations on various uncertain tax positions, a $7.8 million benefit recorded for changes to provisional amounts related to the tax reform legislation enacted in 2017 and the favorable impact of $4.6 million of excess tax benefits related to equity-based compensation awards for 2018. These decreases to the effective tax rate were partially offset by an increase in tax expense due to the effect of the provision for state income taxes, the impact of earnings in foreign jurisdictions that are taxed at rates higher than the U.S., the impact of the new U.S. anti-deferral provisions and the impact of repatriation taxes.

Segment Results

	Year Ended December 31,					
	2019		2018			
	Amount	% of Net Sales	Amount	% of Net Sales	$ Change	% Change
	(dollars in millions)					
Net sales by segment:						
Connectivity	$ 2,557.4	30.6 %	$ 2,812.7	61.6 %	$ (255.3)	(9.1) %
Mobility	1,754.2	21.0	1,755.8	38.4	(1.6)	(0.1)
CPE	2,539.0	30.4	—	—	2,539.0	NM
N&C	1,073.6	12.9	—	—	1,073.6	NM
Ruckus	420.9	5.0	—	—	420.9	NM
Consolidated net sales	$ 8,345.1	100.0 %	$ 4,568.5	100.0 %	$ 3,776.6	82.7 %
Operating income (loss) by segment:						
Connectivity	$ 174.4	6.8 %	$ 271.9	9.7 %	$ (97.5)	(35.9) %
Mobility	180.7	10.3	178.1	10.1	2.6	1.5
CPE	(196.0)	(7.7)	—	—	(196.0)	NM
N&C	(441.5)	(41.1)	—	—	(441.5)	NM
Ruckus	(226.1)	(53.7)	—	—	(226.1)	NM
Consolidated operating income (loss)	$ (508.5)	(6.1) %	$ 450.0	9.9 %	$ (94.9)	(21.1) %
Non-GAAP adjusted operating income by segment:						
Connectivity	$ 412.2	16.1 %	$ 521.8	18.6 %	$ (109.6)	(21.0) %
Mobility	357.9	20.4	316.2	18.0	41.7	13.2
CPE	163.5	6.4	—	—	163.5	NM
N&C	206.4	19.2	—	—	206.4	NM
Ruckus	13.8	3.3	—	—	13.8	NM
Non-GAAP consolidated adjusted operating income (1)	$ 1,153.8	13.8 %	$ 838.0	18.3 %	$ 315.8	37.7 %
Non-GAAP adjusted EBITDA by segment:						
Connectivity	$ 462.1	18.1 %	$ 575.2	20.5 %	$ (113.1)	(19.7) %
Mobility	380.1	21.7	338.4	19.3	41.7	12.3
CPE	193.7	7.6	—	—	193.7	NM
N&C	237.0	22.1	—	—	237.0	NM
Ruckus	24.6	5.8	—	—	24.6	NM
Non-GAAP consolidated adjusted EBITDA (1)	$ 1,297.5	15.5 %	$ 913.6	20.0 %	$ 383.9	42.0 %

(1) See “Reconciliation of Non-GAAP Measures” within this Management’s Discussion and Analysis of Financial Condition and Results of Operations, below.

Connectivity Solutions Segment

Connectivity segment net sales were lower in 2019 compared to the prior year. Approximately 70% of the decline in net sales was due to lower sales volumes, approximately 20% was due to pricing pressure and the remaining decline related to the impacts of foreign exchange rate changes among other factors. From a regional perspective, the Connectivity segment saw declines of $88.6 million in the U.S., $77.4 million in the EMEA region and $70.2 million in the APAC region. Net sales in the U.S. were down due to declines in spending by our cable operator customers. Sales in the EMEA and APAC regions were lower due to decreases in sales of enterprise solutions and to a lesser extent, the impact of unfavorable foreign exchange rate changes.

Connectivity segment operating income and non-GAAP adjusted EBITDA decreased during 2019 compared to the prior year primarily due to lower net sales. For 2019, Connectivity segment operating income was favorably impacted by lower intangible amortization and restructuring costs, partially offset by higher transaction and integration costs, all of which are excluded from non-GAAP adjusted EBITDA. See "Reconciliation of Non-GAAP Measures" within this Management's Discussion and Analysis of Financial Condition and Results of Operations, below.

Mobility Solutions Segment

Mobility segment net sales remained relatively unchanged during 2019 compared to the prior year as pricing pressures were almost fully offset by higher volumes. Foreign exchange rate changes negatively impacted Mobility segment net sales by approximately 1% for 2019 compared to the prior year. From a regional perspective, Mobility segment net sales increased by $71.8 million in the U.S. and $36.4 million in the EMEA region, but these increases were largely offset by a decline of $96.4 million in the APAC region. Sales of metro cell solutions drove the increase in the U.S. while higher sales of distributed antenna systems and macro cell products drove the increase in the EMEA region. Lower sales of macro cell solutions, primarily in India, drove the decrease in sales to the APAC region.

Mobility segment operating income increased slightly for 2019 despite a $55.0 million settlement of a patent infringement claim (see Note 16 in the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K) and a $15.7 million increase in transaction and integration costs. Mobility segment operating income for 2019 benefitted from lower intangible amortization expense, restructuring costs and asset impairments when compared to 2018. All of these costs are excluded from the calculation of non-GAAP adjusted EBITDA, which also increased for 2019 compared to the prior year. The increase in adjusted EBITDA for 2019 was primarily due to favorable geographic mix and lower input costs. See "Reconciliation of Segment adjusted EBITDA" within this Management's Discussion and Analysis of Financial Condition and Results of Operations, below.

Customer Premises Equipment Segment

Net sales to customers outside the U.S. comprised 40.3% of total CPE segment net sales for 2019. These sales to international customers were primarily to customers in the EMEA and Caribbean and Latin America (CALA) regions. CPE segment net sales were unfavorably impacted by acquisition accounting adjustments related to deferred revenue of $5.2 million for 2019.

Operating income for our CPE segment for 2019 was negatively impacted by a goodwill impairment charge of $192.8 million, $27.8 million of acquisition accounting adjustments related to deferred revenue and the mark-up of inventory to its fair value and $23.2 million of restructuring costs for 2019. Asset impairments, acquisition accounting adjustments and restructuring charges are not reflected in non-GAAP adjusted EBITDA.

Network & Cloud Segment

Net sales to customers outside the U.S. comprised 39.5% of total N&C segment net sales for 2019. These sales to international customers were spread across all major geographic regions. N&C segment net sales were unfavorably impacted by acquisition accounting adjustments related to deferred revenue of $29.5 million for 2019.

Operating income for our N&C segment was negatively impacted by a goodwill impairment charge of $142.1 million, $135.8 million of acquisition accounting adjustments related to the mark-up of inventory to its estimated fair value and deferred revenue, $32.1 million of restructuring costs and $100.0 million of transaction and integration costs for 2019. All of these charges are excluded from our calculation of non-GAAP adjusted EBITDA.

Ruckus Networks Segment

Net sales to customers outside the U.S. comprised 44.0% of total Ruckus segment net sales for 2019. Sales to international customers were primarily to customers in the EMEA and APAC regions. Ruckus segment net sales were unfavorably impacted by acquisition accounting adjustments related to deferred revenue of $10.7 million for 2019.

Operating income for our Ruckus segment for 2019 was negatively impacted by $100.6 million of acquisition accounting adjustments related to the mark-up of inventory to its estimated fair value and deferred revenue, a goodwill impairment charge of $41.2 million and transaction and integration costs of $35.3 million. Acquisition accounting adjustments, asset impairments and transaction and integration costs are not included in non-GAAP adjusted EBITDA.

Liquidity and Capital Resources

The following table summarizes certain key measures of our liquidity and capital resources:

	December 31, 2019	December 31, 2018	$ Change	% Change
	(dollars in millions)			
Cash and cash equivalents	$ 598.2	$ 458.2	$ 140.0	30.6 %
Working capital (1), excluding cash and cash equivalents and current portion of long-term debt	903.6	729.0	174.6	24.0
Availability under revolving credit facility	796.8	463.1	333.7	72.1
Long-term debt, including current portion	9,832.4	3,985.9	5,846.5	146.7
Total capitalization (2)	11,668.7	5,742.7	5,926.0	103.2
Long-term debt, including current portion, as a percentage of total capitalization	84.3%	69.4%		

(1) Working capital consists of current assets of $3,511.8 million less current liabilities of $2,042.0 million as of December 31, 2019 and current assets of $1,877.8 million less current liabilities of $690.6 million as of December 31, 2018.

(2) Total capitalization includes long-term debt, including the current portion, Series A convertible preferred stock and stockholders' equity.

Our principal sources of liquidity on a short-term basis are cash and cash equivalents, cash flows provided by operations and availability under credit facilities. To fund the Acquisition, on February 19, 2019 we issued the New Notes, the proceeds from which were held in escrow until they were released on April 4, 2019, the Acquisition date. In February 2019, we also secured the borrowing of $3.2 billion under the 2026 Term Loan with an interest rate of LIBOR plus 3.25% that was funded on the Acquisition date. In addition, at the closing of the Acquisition, we entered into a new asset-based revolving credit facility. Availability under the new asset-based revolving credit facility was $796.8 million as of December 31, 2019, reflecting a borrowing base of $820.9 million reduced by $24.1 million of letters of credit under the facility. We did not borrow under the new asset-based revolving credit facility to fund the Acquisition, but we did borrow and repay $15.0 million under the facility in the second quarter of 2019. In addition to incremental new debt, we funded the Acquisition by issuing the Convertible Preferred Stock to Carlyle for an aggregate investment of $1.0 billion. The Convertible Preferred Stock pays dividends at an annual rate of 5.50%, with dividends payable quarterly and is convertible at the option of the holders at any time into shares of CommScope common stock at a price of $27.50 per share, subject to certain limits on the number of shares that may be issued unless we obtain shareholder approval. On a long-term basis, our potential sources of liquidity also include raising capital through the issuance of additional equity and/or debt.

The primary uses of liquidity include debt service requirements (including voluntary debt repayments or redemptions), funding working capital requirements, paying acquisition integration costs, capital expenditures, paying restructuring costs, paying dividends related to the Convertible Preferred Stock and income tax payments. We believe that our existing cash, cash equivalents and cash flows from operations, combined with availability under our new asset-based revolving credit facility and access to capital markets, will be sufficient to meet our presently anticipated future cash needs. We may experience volatility in cash flows between periods due to, among other reasons, variability in the timing of vendor payments and customer receipts. We may, from time to time, borrow under our revolving credit facility or issue securities, if market conditions are favorable, to meet future cash needs or to reduce our borrowing costs.

Although there are no financial maintenance covenants under the terms of our senior notes, there is a limitation, among other limitations, on certain future borrowings based on an adjusted leverage ratio or a fixed charge coverage ratio. These ratios are based on financial measures similar to non-GAAP adjusted EBITDA as presented in the “Reconciliation of Non-GAAP Measures” section below, but also give pro forma effect to certain events, including acquisitions, synergies and savings from cost reduction initiatives such as facility closures and headcount reductions. For the year ended December 31, 2019, our non-GAAP pro forma adjusted EBITDA, as measured pursuant to the indentures governing our notes, was $1,481.6 million, which included increases to our non-GAAP adjusted EBITDA related to the ARRIS business from January 1, 2019 to the Acquisition date, calculated in accordance with CommScope’s definition ($70.8 million); annualized synergies expected to be realized in the three years following the close of the Acquisition ($105.0 million); and annualized savings expected from announced cost reduction initiatives ($8.3 million) so that the impact of the cost reduction initiatives is fully reflected in the twelve-month period used in the calculation of the ratios. In addition to limitations under these indentures, our senior secured credit facilities contain customary negative covenants based on similar financial measures. We believe we are in compliance with the covenants under our indentures and senior secured credit facilities at December 31, 2019.

Cash and cash equivalents increased during 2019 primarily due to the addition of the ARRIS business, partially offset by funding the Acquisition, settling assumed ARRIS debt, payments on the 2022 Term Loan, redemptions of the 2021 Notes, acquisition-related payments and restructuring payments. As of December 31, 2019, approximately 57% of our cash and cash equivalents were held outside the U.S.

Working capital, excluding cash and cash equivalents and the current portion of long-term debt, increased during 2019 due to the Acquisition. Excluding the ARRIS business, working capital, excluding cash and cash equivalents, decreased mainly due to higher accrued interest related to the debt incurred to finance the Acquisition coupled with lower accounts receivable balances. The increase in total capitalization during 2019 reflected the proceeds from the New Notes funded in the first quarter, the 2026 Term Loan, which was funded on the Acquisition date, and the Convertible Preferred Stock, all of which were utilized to fund a substantial portion of the Acquisition on April 4, 2019.

Cash Flow Overview

Comparison for the year ended December 31, 2019 with the year ended December 31, 2018

	Year Ended December 31, 2019	Year Ended December 31, 2018	$ Change	% Change
	(dollars in millions)			
Net cash generated by operating activities	$ 596.4	$ 494.1	$ 102.3	20.7 %
Net cash used in investing activities	(5,154.9)	(64.3)	(5,090.6)	NM
Net cash generated by (used in) financing activities	4,698.6	(409.6)	5,108.2	NM

NM - Not meaningful

Operating Activities

	Year Ended December 31, 2019	Year Ended December 31, 2018
Operating Activities:		
Net income (loss)	$ (929.5)	$ 140.2
Adjustments to reconcile net income (loss) to net cash generated by operating activities:		
Depreciation and amortization	770.9	357.5
Equity-based compensation	90.8	44.9
Deferred income taxes	(260.8)	(49.2)
Asset impairments	376.1	15.0
Changes in assets and liabilities:		
Accounts receivable	258.8	65.1
Inventories	489.1	(48.5)
Prepaid expenses and other assets	19.5	1.0
Accounts payable and other accrued liabilities	(274.0)	(0.8)
Other noncurrent liabilities	7.2	(54.6)
Other noncurrent assets	46.0	(8.0)
Other	2.3	31.5
Net cash generated by operating activities	$ 596.4	$ 494.1

During 2019, cash generated from operating activities increased compared to the prior year period due to addition of the ARRIS business partially offset by the payment of $233.9 million more in interest as a result of the Acquisition-related debt and payments of $210.7 million of transaction and integration costs related to the Acquisition during 2019. We also paid $49.7 million more in restructuring costs for 2019 compared to the prior year. The change in inventory during 2019 reflects $218.8 million of acquisition accounting adjustments related to the mark-up of inventory to its estimated fair value.

Investing Activities

	Year Ended December 31,	
	2019	2018
Investing Activities:		
Additions to property, plant and equipment	$ (104.1)	$ (82.3)
Proceeds from sale of property, plant and equipment	1.6	12.9
Cash paid for current year acquisitions, net of cash acquired	(5,053.4)	—
Cash paid for prior year acquisition	(11.0)	—
Proceeds from sale of long-term investments	9.3	—
Proceeds upon settlement of net investment hedge	2.7	5.1
Net cash used in investing activities	$ (5,154.9)	$ (64.3)

During 2019, we paid $5.1 billion, net of cash acquired, to fund the Acquisition using a combination of cash on hand, proceeds from the issuance of long-term debt and proceeds from the issuance of the Convertible Preferred Stock. Our investment in property, plant and equipment during 2019 was $21.8 million higher than 2018, primarily as a result of the addition of ARRIS' investment in property, plant and equipment since the Acquisition date. Our investments in property, plant and equipment were primarily related to supporting improvements in manufacturing operations, including expanding production capacity and investing in information technology, including software developed for internal use. During 2019, we also paid $11.0 million of the $14.5 million liability for remaining payments due related to the August 2017 acquisition of Cable Exchange. In addition, during 2019, we received proceeds of $9.3 million on the sale of certain investments. During 2019 and 2018, we sold property and equipment no longer being utilized for $1.6 million and $12.9 million, respectively. During 2019 and 2018, we received $2.7 million and $5.1 million, respectively, to settle net investment hedges that we entered into for the purpose of mitigating a portion of the foreign currency risk on the euro net investment in a foreign subsidiary.

Financing Activities

	Year Ended December 31,	
	2019	2018
Financing Activities:		
Long-term debt repaid	$ (3,061.3)	$ (550.0)
Long-term debt proceeds	6,933.0	150.0
Debt issuance costs	(120.8)	—
Series A convertible preferred stock proceeds	1,000.0	—
Dividends paid on Series A convertible preferred stock	(40.7)	—
Deemed dividend paid on Series A convertible preferred stock	(3.0)	—
Proceeds from the issuance of common shares under equity-based compensation plans	4.6	6.1
Tax withholding payments for vested equity-based compensation awards	(13.2)	(15.7)
Net cash generated by (used in) financing activities	$ 4,698.6	$ (409.6)

During 2019, we received net proceeds from the issuance of the New Notes and the 2026 Term Loan of $6.9 billion to fund the Acquisition. On the date of the Acquisition, we also entered into a new asset-based revolving credit facility in an amount up to $1.0 billion, which had availability of $796.8 million as of December 31, 2019, reflecting a borrowing base of $820.9 billion reduced by $24.1 million of letters of credit issued under the facility. We borrowed and repaid $15.0 million under the new asset-based revolving credit facility during the second quarter of 2019. We had no outstanding borrowings under the new asset-based revolving credit facility as of December 31, 2019. In connection with these financing transactions, we paid $120.8 million of debt issuance costs during 2019.

We repaid $225.0 million of the 2022 Term Loan in the first quarter of 2019 and we repaid the remaining balance of $261.3 million on April 4, 2019 using proceeds from the 2026 Term Loan. As part of funding the Acquisition, we repaid ARRIS' outstanding debt of $2.1 billion under its senior secured credit facilities. We redeemed $500.0 million aggregate principal amount of our 2021 Notes during 2019. We also paid an $8.0 million scheduled payment during December 2019 related to the 2026 Term Loan. We may repurchase more of our senior notes if market conditions are favorable and the applicable indenture and the credit agreements governing the senior secured credit facilities permit such repayment or repurchase. In addition, we may refinance portions of our existing debt to lower borrowing costs, extend the term or adjust the total amount of fixed or floating-rate debt.

In addition to the new debt, we funded the Acquisition by issuing the Convertible Preferred Stock to Carlyle for an aggregate investment of $1.0 billion. We paid $3.0 million in transaction fees on Carlyle's behalf related to the Convertible Preferred Stock and we treated that as a deemed dividend during 2019. During 2019, we paid $40.7 million in authorized dividends for the Convertible Preferred Stock.

During 2019, we received proceeds of $4.6 million related to the exercise of stock options. Also during 2019, employees surrendered 0.7 million shares of our common stock to satisfy their tax withholding requirements on vested restricted stock units and performance share units, which reduced cash flows by $13.2 million. During 2018, we received proceeds of $6.1 million related to the exercise of stock options and employees surrendered 0.4 million shares of our common stock to satisfy their tax withholding requirements on vested restricted stock units, which reduced cash flows by $15.7 million.

Reconciliation of Non-GAAP Measures

We believe that presenting certain non-GAAP financial measures enhances an investor's understanding of our financial performance. We further believe that these financial measures are useful in assessing our operating performance from period to period by excluding certain items that we believe are not representative of our core business. We also use certain of these financial measures for business planning purposes and in measuring our performance relative to that of our competitors.

We believe these financial measures are commonly used by investors to evaluate our performance and that of our competitors. However, our use of the terms non-GAAP adjusted operating income and non-GAAP adjusted EBITDA may vary from that of others in our industry. These financial measures should not be considered as alternatives to operating income (loss), net income (loss) or any other performance measures derived in accordance with U.S. GAAP as measures of operating performance, operating cash flows or liquidity.

Although there are no financial maintenance covenants under the terms of our senior notes, there is a limitation, among other limitations, on certain future borrowings based on an adjusted leverage ratio or a fixed charge coverage ratio. These ratios are based on financial measures similar to non-GAAP adjusted EBITDA as presented in this section, but also give pro forma effect to certain events, including acquisitions and savings from cost reduction initiatives such as facility closures and headcount reductions.

Consolidated

	Year Ended December 31,		
	2019	2018	2017
	(in millions)		
Net income (loss)	$ (929.5)	$ 140.2	$ 193.8
Income tax expense (benefit)	(144.5)	30.5	16.0
Interest income	(18.1)	(7.0)	(4.2)
Interest expense	577.2	242.0	257.0
Other expense, net	6.4	44.3	9.4
Operating income (loss)	$ (508.5)	$ 450.0	$ 472.0
Adjustments:			
Amortization of purchased intangible assets	593.2	264.6	271.0
Restructuring costs, net	87.7	44.0	43.8
Equity-based compensation	90.8	44.9	41.8
Asset impairments	376.1	15.0	—
Transaction and integration costs (1)	195.3	19.5	48.0
Purchase accounting adjustments (2)	264.2	—	—
Patent litigation settlement	55.0	—	—
Non-GAAP adjusted operating income	$ 1,153.8	$ 838.0	$ 876.7
Depreciation	143.7	75.6	81.7
Non-GAAP adjusted EBITDA	$ 1,297.5	$ 913.6	$ 958.4

(1) In 2019, primarily reflects transaction and integration costs related to the Acquisition. In 2018 and 2017, primarily reflects integration costs related to the acquisition of the BNS business, transaction costs related to potential and consummated acquisitions and costs related to secondary stock offerings.

(2) For the year ended December 31, 2019, reflects purchase accounting adjustments of $218.8 million related to the mark up of inventory to its estimated fair value and purchase accounting adjustments of $45.4 million related to reducing deferred revenue to its estimated fair value.

Reconciliation of Segment Adjusted EBITDA

Segment adjusted EBITDA is provided as a performance measure in Note 17 in the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K. Below we reconcile segment adjusted EBITDA for each segment individually to operating income for that segment to supplement the reconciliation of the total segment adjusted EBITDA to consolidated operating income in that footnote.

Connectivity Segment

	Year Ended December 31,		
	2019	2018	2017
	(in millions)		
Operating income	$ 174.4	$ 271.9	$ 239.0
Adjustments:			
Amortization of purchased intangible assets	161.4	178.6	175.5
Restructuring costs, net	12.4	24.2	36.6
Equity-based compensation	24.6	27.3	24.4
Asset impairments	—	7.5	—
Transaction and integration costs	39.4	12.3	47.9
Depreciation	49.9	53.4	58.5
Adjusted EBITDA	$ 462.1	$ 575.2	$ 581.8

Mobility Segment

	Year Ended December 31,		
	2019	2018	2017
	(in millions)		
Operating income	$ 180.7	$ 178.1	$ 233.0
Adjustments:			
Amortization of purchased intangible assets	71.1	86.0	95.5
Restructuring costs, net	11.2	19.8	7.2
Equity-based compensation	16.9	17.6	17.5
Asset impairments	—	7.5	—
Transaction and integration costs	23.0	7.3	0.2
Patent litigation settlement	55.0	—	—
Depreciation	22.2	22.2	23.2
Adjusted EBITDA	$ 380.1	$ 338.4	$ 376.6

CPE Segment

	Year Ended December 31,		
	2019	2018	2017
	(in millions)		
Operating loss	$ (196.0)	$ —	$ —
Adjustments:			
Amortization of purchased intangible assets	103.9	—	—
Restructuring costs, net	23.2	—	—
Equity-based compensation	14.1	—	—
Asset impairments	192.8	—	—
Transaction and integration costs	(2.3)	—	—
Purchase accounting adjustments	27.8	—	—
Depreciation	30.2		
Adjusted EBITDA	$ 193.7	$ —	$ —

N&C Segment

	Year Ended December 31,		
	2019	2018	2017
		(in millions)	
Operating loss	$ (441.5)	$ —	$ —
Adjustments:			
Amortization of purchased intangible assets	212.7	—	—
Restructuring costs, net	32.1	—	—
Equity-based compensation	25.2		
Asset impairments	142.1	—	—
Transaction and integration costs	100.0	—	—
Purchase accounting adjustments	135.8	—	—
Depreciation	30.6		
Adjusted EBITDA	$ 237.0	$ —	$ —

Ruckus Segment

	Year Ended December 31,		
	2019	2018	2017
		(in millions)	
Operating loss	$ (226.1)	$ —	$ —
Adjustments:			
Amortization of purchased intangible assets	44.1	—	—
Restructuring costs, net	8.8	—	—
Equity-based compensation	10.0	—	—
Asset impairments	41.2	—	—
Transaction and integration costs	35.2	—	—
Purchase accounting adjustments	100.6	—	—
Depreciation	10.8		
Adjusted EBITDA	$ 24.6	$ —	$ —

Note: Components may not sum to total due to rounding

Contractual Obligations

In February 2019, we issued the New Notes and repaid $225.0 million of the 2022 Term Loan. In April 2019, we completed the Acquisition, borrowed $3.2 billion under the 2026 Term Loan and repaid the remaining $261.3 million of the 2022 Term Loan. During the third and fourth quarters of 2019, we redeemed $500.0 million of the 2021 Notes. The following table summarizes our contractual obligations as of December 31, 2019. This table does not include the obligations related to our Series A convertible preferred stock discussed in Note 14 in our Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K.

Contractual Obligations	Total Payments Due	Amount of Payments Due per Period: 2020	2021-2022	2023-2024	Thereafter
	(in millions)				
Long-term debt, including current maturities (a)	$ 9,992.0	$ 32.0	$ 214.0	$ 1,964.0	$ 7,782.0
Interest on long-term debt (a)(b)	3,434.0	576.0	1,135.8	1,071.0	651.2
Operating leases	259.6	74.7	107.0	55.2	22.7
Purchase obligations and other supplier agreements (c)	347.2	347.2	—	—	—
Pension and other postretirement benefit liabilities (d)	9.0	6.3	0.8	0.7	1.2
Restructuring costs, net (e)	26.3	21.9	4.4	—	—
Patent litigation settlement (f)	55.0	55.0	—	—	—
Unrecognized tax benefits (g)	—	—	—	—	—
Total contractual obligations	$ 14,123.1	$ 1,113.1	$ 1,462.0	$ 3,090.9	$ 8,457.1

(a) No prepayment or redemption of any of our long-term debt balances has been assumed. Refer to Note 8 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K for information regarding the terms of our long-term debt agreements.

(b) Interest on long-term debt excludes the amortization of debt issuance costs and original issue discount. Interest on variable rate debt is estimated based upon rates in effect as of December 31, 2019.

(c) Purchase obligations and other supplier agreements include $332.2 million related to obligations, primarily to our contract manufacturers, with non-cancelable terms to purchase goods or services; payments of $11.4 million due in 2020 for minimum amounts owed under take-or-pay or requirements contracts; and $3.6 million purchase price payments due in 2020 related to the acquisition of Cable Exchange. Generally, amounts covered by open purchase orders, other than the portion that is noncancelable as disclosed above, are excluded as there is no contractual obligation until goods or services are received.

(d) Amounts reflect expected contributions related to payments under the postretirement benefit plans through 2029 and expected pension contributions of $5.9 million in 2020 (see Note 12 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K).

(e) Future restructuring payments exclude payments due under lease arrangements which are included in operating leases above.

(f) Amount reflects the settlement of patent litigation. The payment is due in two installments, with $30.0 due in January 2020 and $25.0 million due in June 2020.

(g) Due to the uncertainty in predicting the timing of tax payments related to our unrecognized tax benefits, $156.6 million has been excluded from the presentation. We anticipate a reduction of up to $6.0 million of unrecognized tax benefits during the next twelve months (see Note 13 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K).

Recent Accounting Pronouncements

See Note 1 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K for a discussion of recent accounting pronouncements.

Off-Balance Sheet Arrangements

We were not a party to any significant off-balance sheet arrangements during the year ended December 31, 2019.

Effects of Inflation and Changing Prices

We continually attempt to minimize the effect of inflation on earnings by controlling our operating costs and adjusting our selling prices. The principal raw materials and components purchased by us (memory and chip capacitors, copper, aluminum, steel, optical fiber, plastics and other polymers) are subject to changes in market price as they are influenced by commodity markets and other factors. Prices for these items have, at times, been volatile. As a result, we have adjusted our prices for certain products and may have to adjust prices again in the future. To the extent that we are unable to pass on cost increases to customers without a significant decrease in sales volume or must implement price reductions in response to a rapid decline in raw material costs, these cost changes could have a material adverse impact on the results of our operations.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

We are exposed to market risks related to changes in interest rates, foreign currency exchange rates and commodity prices. We may utilize derivative financial instruments, among other methods, to hedge some of these exposures. We do not use derivative financial instruments for speculative or trading purposes.

Interest Rate Risk

The table below summarizes the expected interest and principal payments associated with our variable rate debt outstanding at December 31, 2019 (mainly the $3.2 billion variable rate 2026 Term Loan and new asset-based revolving credit facility). The principal payments presented below are based on scheduled maturities and assume no borrowings under the new asset-based revolving credit facility. The interest payments presented below assume the interest rates in effect as of December 31, 2019 (see Note 8 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K). The impact of a 1% increase in the interest rate index on projected future interest payments on the variable rate debt is also included in the table below.

	2020	2021	2022	2023	2024	There-after
	(dollars in millions)					
Principal and interest payments on variable rate debt	$ 196.0	$ 194.3	$ 192.7	$ 191.1	$ 187.1	$ 3,203.2
Average cash interest rate	5.16%	5.16%	5.17%	5.17%	5.09%	5.05%
Impact of 1% increase in interest rate index	$ 31.8	$ 31.4	$ 31.1	$ 30.8	$ 30.5	$ 33.9

We also have $6.8 billion aggregate principal amount of fixed rate senior notes. The table below summarizes our expected interest and principal payments related to our fixed rate debt at December 31, 2019.

	2020	2021	2022	2023	2024	There-after
	(dollars in millions)					
Principal and interest payments on fixed rate debt	$ 412.0	$ 558.3	$ 404.5	$ 404.5	$ 2,252.3	$ 5,230.0
Average cash interest rate	6.06%	6.07%	6.08%	6.08%	6.18%	6.61%

As part of our hedging strategy to mitigate a portion of the exposure to changes in cash flows resulting from the variable interest rate on the 2026 Term Loan, in March 2019, we entered into and designated pay-fixed, receive-variable interest rate swap derivatives as cash flow hedges of interest rate risk. The total notional amount of the interest rate swap derivatives as of December 31, 2019 was $600 million with outstanding maturities of up to fifty-one months. As of December 31, 2019, the combined fair value of the interest rate swaps was a $16.3 million loss. The table above excludes the impact of these interest rate swap derivatives.

Foreign Currency Risk

Approximately 41% and 44% of net sales for 2019 and 2018, respectively, were to customers located outside the U.S. Significant changes in foreign currency exchange rates could adversely affect our international sales levels and the related collection of amounts due. In addition, a significant decline in the value of currencies used in certain regions of the world as compared to the U.S. dollar could adversely affect product sales in those regions because our products may become more expensive for those customers to pay for in their local currency. Conversely, significant increases in the value of foreign currencies as compared to the U.S. dollar could adversely affect profitability as certain product costs increase relative to a U.S. dollar-denominated sales price. The foreign currencies to which we have the greatest exposure include the Chinese yuan, euro, Czech koruna, Australian dollar, Indian rupee, Mexican peso and Brazilian real. Local manufacturing provides a partial natural hedge and we continue to evaluate additional alternatives to help us reasonably manage the market risk related to foreign currency exposures.

We use derivative instruments such as forward exchange contracts to manage the risk of fluctuations in the value of certain foreign currencies. As of December 31, 2019, we had foreign exchange contracts with a net unrealized loss of $1.0 million, with maturities of up to ten months and aggregate notional value of $508 million (based on exchange rates as of December 31, 2019). These contracts are not designated as hedges for accounting purposes and are marked to market each period through earnings and, as such, there were no unrecognized gains or losses as of December 31, 2019 or 2018. In addition, we hold certain foreign exchange forward contracts and cross currency swaps designated as net investment hedges to mitigate a portion of the foreign currency risk on the Euro net investment in a foreign subsidiary. As of December 31, 2019, the notional value of these derivative contracts was $300 million, with outstanding maturities of up to eighteen months. The unrealized gain on the contracts was $5.8 million. Our derivative instruments are not leveraged and are not held for trading or speculation. See Note 9 in the Notes to Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K for further discussion of these contracts. We continuously evaluate the amount and type of derivative instruments utilized to manage the market risk related to foreign currency exposures.

Commodity Price Risk

Materials account for a large portion of our cost of sales. These materials, such as copper, aluminum, steel, plastics and other polymers, bimetals and optical fiber, are subject to changes in market price as they are influenced by commodity markets and supply and demand levels, among other factors. Management attempts to mitigate these risks through effective requirements planning and by working closely with key suppliers to obtain the best possible pricing and delivery terms. We may also enter into agreements with certain suppliers to guarantee our access to certain key components. As of December 31, 2019, we had forward purchase commitments outstanding under take-or-pay contracts for certain metals of approximately $11.4 million that we expect to consume in the normal course of operations through the second quarter of 2020. We continuously evaluate the amount and type of derivative instruments utilized to manage commodity price risk.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Index to Financial Statements

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of CommScope Holding Company, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of CommScope Holding Company, Inc. (the Company) as of December 31, 2019 and 2018, and the related consolidated statements of operations, comprehensive income (loss), stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at 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 U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 20, 2020 expressed an unqualified opinion thereon.

Adoption of New Accounting Standard

As discussed in Note 2 to the consolidated financial statements, the Company changed its method of accounting for leased assets previously classified as operating leases in 2019 due to the adoption of ASU No. 2016-02, *Leases (Topic 842)*.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the 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 audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the 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 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 financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) 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 matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Accounting for the ARRIS International plc (ARRIS) Acquisition

Description of the Matter	During 2019, the Company completed its acquisition of ARRIS for total consideration of $7,669.7 million, as disclosed in Note 3 to the consolidated financial statements. The transaction was accounted for as a business combination. The consideration paid in the acquisition must be allocated to the acquired assets and liabilities assumed generally based on their fair value with the excess of the purchase price over those fair values allocated to goodwill. Auditing the Company's accounting for its acquisition of ARRIS was complex due to the significant estimation uncertainty in the Company's determination of the fair value of identified intangible assets of $3,509.6 million, which principally consisted of customer contracts and relationships, patents and technologies and trademarks. The significant estimation uncertainty was primarily due to the sensitivity of the respective fair values to the significant underlying assumptions. The significant assumptions used to estimate the value of the intangible assets included certain assumptions that form the basis of the forecasted results (e.g., revenue growth rates and EBITDA margin). These significant assumptions are forward looking and were based on expectations of future economic and market conditions.
How We Addressed the Matter in Our Audit	We obtained an understanding, evaluated the design and tested the operating effectiveness of the Company's controls over its accounting for the acquisition of ARRIS. For example, we tested controls over the estimation process supporting the recognition and measurement of the intangible assets acquired, including customer contracts and relationships, patents and technologies and trademarks, including the valuation models and management's review of the underlying assumptions used to develop such estimates. To test the estimated fair value of the ARRIS acquired customer contracts and relationships, patents and technologies and trademarks intangible assets, we performed audit procedures that included, among others, evaluating the selection of the valuation methodologies used, evaluating the significant assumptions used by the Company, and evaluating the completeness and accuracy of the underlying data supporting the significant assumptions and estimates. For example, we compared the significant assumptions for revenue growth rates and EBITDA margin to industry, market and economic trends, to the assumptions used to value similar assets in other acquisitions and to the historical results of the acquired ARRIS business. We also involved our valuation specialists to assist with our evaluation of the methodology used by the Company and significant assumptions included in the fair value estimates.

Valuation of Goodwill for Certain Reporting Units

Description of the Matter	As more fully described in Note 4 to the consolidated financial statements, at December 31, 2019, the Company's goodwill was $5,471.7 million, of which $209.3 million relates to the Customer Premises Equipment (CPE) reporting unit, $2,029.1 million relates to the Network and Cloud (N&C) reporting unit, and $375.8 million relates to the Ruckus Networks (Ruckus) reporting unit. The Company's goodwill is initially assigned to its reporting units as of the acquisition date. Goodwill is tested for impairment at least annually at the reporting unit level. As a result of the annual impairment test performed in the fourth quarter of 2019, the Company recorded goodwill impairment charges totaling $376.1 million for these reporting units as the estimated fair values were less than their carrying values. Auditing management's annual goodwill impairment test was complex and highly judgmental due to the significant estimation required in determining the fair value of the CPE, N&C and Ruckus reporting units. In particular, for these reporting units, the fair value estimates were sensitive to significant assumptions such as the weighted average cost of capital (WACC), revenue growth rate and operating margin, which are affected by expectations about future market or economic conditions.
How We Addressed the Matter in Our Audit	We evaluated the Company's assessment of the impairment of goodwill for the CPE, N&C and Ruckus reporting units. We obtained an understanding, evaluated the design and tested the operating effectiveness of the Company's controls that address the risks of material misstatement relating to the annual goodwill impairment test and impairment of goodwill for these reporting units, including controls over management's development and review of the significant assumptions discussed above. To test the estimated fair value of the CPE, N&C and Ruckus reporting units, we performed audit procedures with the assistance of our valuation specialists that included, among others, assessing methodologies and testing the significant assumptions discussed above and the underlying data used by the Company in its analysis. We compared the significant assumptions of revenue growth rate and operating margin used by management to current industry and economic trends, changes to the Company's business model, customer base or product mix or other relevant factors. We evaluated the Company's WACC methodology and developed independent ranges of reasonable WACCs. We also evaluated the reasonableness of the guideline public companies used to develop fair value estimates for the CPE, N&C and Ruckus reporting units. We assessed the historical accuracy of management's estimates and performed sensitivity analyses of significant assumptions to evaluate the changes in the fair value of these reporting units that would result from changes in the assumptions.

/s/ Ernst & Young LLP
We have served as the Company's auditor since 2008.
Charlotte, North Carolina
February 20, 2020

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of CommScope Holding Company, Inc.

Opinion on Internal Control Over Financial Reporting

We have audited CommScope Holding Company, Inc.'s internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, CommScope Holding Company, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2019 and 2018, the related consolidated statements of operations and comprehensive income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and our report dated February 20, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) 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 (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ Ernst & Young LLP
Charlotte, North Carolina
February 20, 2020

CommScope Holding Company, Inc.
Consolidated Statements of Operations
(In millions, except per share amounts)

	Year Ended December 31,		
	2019	2018	2017
Net sales	$ 8,345.1	$ 4,568.5	$ 4,560.6
Cost of sales	5,941.0	2,935.2	2,855.1
Gross profit	2,404.1	1,633.3	1,705.5
Operating expenses:			
Selling, general and administrative	1,277.1	674.0	733.1
Research and development	578.5	185.7	185.6
Amortization of purchased intangible assets	593.2	264.6	271.0
Restructuring costs, net	87.7	44.0	43.8
Asset impairments	376.1	15.0	—
Total operating expenses	2,912.6	1,183.3	1,233.5
Operating income (loss)	(508.5)	450.0	472.0
Other expense, net	(6.4)	(44.3)	(9.4)
Interest expense	(577.2)	(242.0)	(257.0)
Interest income	18.1	7.0	4.2
Income (loss) before income taxes	(1,074.0)	170.7	209.8
Income tax (expense) benefit	144.5	(30.5)	(16.0)
Net income (loss)	(929.5)	140.2	193.8
Series A convertible preferred stock dividend	(40.7)	—	—
Deemed dividend on Series A convertible preferred stock	(3.0)	—	—
Net income (loss) attributable to common stockholders	$ (973.2)	$ 140.2	$ 193.8
Earnings (loss) per share:			
Basic	$ (5.02)	$ 0.73	$ 1.01
Diluted	$ (5.02)	$ 0.72	$ 0.98
Weighted average shares outstanding:			
Basic	193.7	192.0	192.4
Diluted	193.7	195.3	196.8

See notes to consolidated financial statements.

CommScope Holding Company, Inc.
Consolidated Statements of Comprehensive Income (Loss)
(In millions)

	Year Ended December 31, 2019	2018	2017
Comprehensive income (loss):			
Net income (loss)	$ (929.5)	$ 140.2	$ 193.8
Other comprehensive income (loss), net of tax:			
Foreign currency translation gain (loss)	(22.2)	(87.7)	201.4
Defined benefit plans:			
Change in unrecognized actuarial gain (loss)	(8.1)	23.3	6.9
Change in unrecognized net prior service credit	—	(11.7)	(2.3)
Gain (loss) on hedging instruments	(7.5)	3.5	(5.0)
Available-for-sale securities	—	—	(2.5)
Total other comprehensive income (loss), net of tax	(37.8)	(72.6)	198.5
Total comprehensive income (loss)	$ (967.3)	$ 67.6	$ 392.3

See notes to consolidated financial statements.

CommScope Holding Company, Inc.
Consolidated Balance Sheets
(In millions, except share amounts)

	December 31, 2019	December 31, 2018
Assets		
Cash and cash equivalents	$ 598.2	$ 458.2
Accounts receivable, less allowance for doubtful accounts of $35.4 and $17.4, respectively	1,698.8	810.4
Inventories, net	975.9	473.3
Prepaid expenses and other current assets	238.9	135.9
Total current assets	3,511.8	1,877.8
Property, plant and equipment, net of accumulated depreciation of $553.8 and $437.7, respectively	723.8	450.9
Goodwill	5,471.7	2,852.3
Other intangible assets, net	4,263.6	1,352.0
Other noncurrent assets	460.7	97.5
Total assets	$ 14,431.6	$ 6,630.5
Liabilities and Stockholders' Equity		
Accounts payable	$ 1,148.0	$ 399.2
Accrued and other liabilities	862.0	291.4
Current portion of long-term debt	32.0	—
Total current liabilities	2,042.0	690.6
Long-term debt	9,800.4	3,985.9
Deferred income taxes	215.1	83.3
Other noncurrent liabilities	537.8	113.9
Total liabilities	12,595.3	4,873.7
Commitments and contingencies		
Series A convertible preferred stock, $0.01 par value	1,000.0	—
Stockholders' equity:		
Preferred stock, $0.01 par value: Authorized shares: 200,000,000; Issued and outstanding shares: 1,000,000 Series A convertible preferred stock	—	—
Common stock, $0.01 par value: Authorized shares: 1,300,000,000; Issued and outstanding shares: 194,563,530 and 192,376,255, respectively	2.0	2.0
Additional paid-in capital	2,445.1	2,385.1
Retained earnings (accumulated deficit)	(1,179.3)	(249.8)
Accumulated other comprehensive loss	(197.0)	(159.2)
Treasury stock, at cost: 7,411,382 shares and 6,744,082 shares, respectively	(234.5)	(221.3)
Total stockholders' equity	836.3	1,756.8
Total liabilities and stockholders' equity	$ 14,431.6	$ 6,630.5

See notes to consolidated financial statements.

CommScope Holding Company, Inc.
Consolidated Statements of Cash Flows
(In millions)

	Year Ended December 31,		
	2019	2018	2017
Operating Activities:			
Net income (loss)	$ (929.5)	$ 140.2	$ 193.8
Adjustments to reconcile net income (loss) to net cash generated by operating activities:			
Depreciation and amortization	770.9	357.5	378.0
Equity-based compensation	90.8	44.9	41.8
Deferred income taxes	(260.8)	(49.2)	(71.5)
Asset impairments	376.1	15.0	—
Changes in assets and liabilities:			
Accounts receivable	258.8	65.1	96.7
Inventories	489.1	(48.5)	53.7
Prepaid expenses and other current assets	19.5	1.0	(1.3)
Accounts payable and other accrued liabilities	(274.0)	(0.8)	(154.7)
Other noncurrent liabilities	7.2	(54.6)	14.6
Other noncurrent assets	46.0	(8.0)	(8.4)
Other	2.3	31.5	43.6
Net cash generated by operating activities	596.4	494.1	586.3
Investing Activities:			
Additions to property, plant and equipment	(104.1)	(82.3)	(68.7)
Proceeds from sale of property, plant and equipment	1.6	12.9	5.4
Cash paid for current year acquisitions, net of cash acquired	(5,053.4)	—	(105.2)
Cash paid for prior year acquisition	(11.0)	—	—
Proceeds from sale of long-term investments	9.3	—	9.9
Proceeds (payments) upon settlement of net investment hedge	2.7	5.1	(7.6)
Net cash used in investing activities	(5,154.9)	(64.3)	(166.2)
Financing Activities:			
Long-term debt repaid	(3,061.3)	(550.0)	(990.4)
Long-term debt proceeds	6,933.0	150.0	780.4
Debt issuance and modification costs	(120.8)	—	(8.4)
Debt extinguishment costs	—	—	(14.8)
Series A convertible preferred stock proceeds	1,000.0	—	—
Dividends paid on Series A convertible preferred stock	(40.7)	—	—
Deemed dividend paid on Series A convertible preferred stock	(3.0)	—	—
Cash paid for repurchase of common stock	—	—	(175.0)
Proceeds from the issuance of common shares under equity-based compensation plans	4.6	6.1	9.9
Tax withholding payments for vested equity-based compensation awards	(13.2)	(15.7)	(15.4)
Net cash generated by (used in) financing activities	4,698.6	(409.6)	(413.7)
Effect of exchange rate changes on cash and cash equivalents	(0.1)	(16.0)	19.4
Change in cash and cash equivalents	140.0	4.2	25.8
Cash and cash equivalents at beginning of period	458.2	454.0	428.2
Cash and cash equivalents at end of period	$ 598.2	$ 458.2	$ 454.0

See notes to consolidated financial statements.

CommScope Holding Company, Inc.
Consolidated Statements of Stockholders' Equity
(In millions, except share amounts)

	Year Ended December 31,		
	2019	2018	2017
Number of common shares outstanding:			
Balance at beginning of period	192,376,255	190,906,110	193,837,437
Issuance of shares under equity-based compensation plans	2,854,575	1,878,083	2,275,595
Shares surrendered under equity-based compensation plans	(667,300)	(407,938)	(411,932)
Repurchase of common stock	—	—	(4,794,990)
Balance at end of period	194,563,530	192,376,255	190,906,110
Common stock:			
Balance at beginning and end of period	$ 2.0	$ 2.0	$ 2.0
Additional paid-in capital:			
Balance at beginning of period	$ 2,385.1	$ 2,334.1	$ 2,282.1
Issuance of shares under equity-based compensation plans	4.6	6.1	9.9
Equity-based compensation	90.8	44.9	41.8
Equity-based compensation assumed	8.3	—	—
Cumulative effect of change in accounting principle	—	—	0.3
Dividend on Series A convertible preferred stock	(40.7)	—	—
Deemed dividend on Series A convertible preferred stock	(3.0)	—	—
Balance at end of period	$ 2,445.1	$ 2,385.1	$ 2,334.1
Retained earnings (accumulated deficit):			
Balance at beginning of period	$ (249.8)	$ (396.0)	$ (589.6)
Net income (loss)	(929.5)	140.2	193.8
Cumulative effect of change in accounting principles	—	6.0	(0.2)
Balance at end of period	$ (1,179.3)	$ (249.8)	$ (396.0)
Accumulated other comprehensive loss:			
Balance at beginning of period	$ (159.2)	$ (86.6)	$ (285.1)
Other comprehensive loss, net of tax:	(37.8)	(72.6)	198.5
Balance at end of period	$ (197.0)	$ (159.2)	$ (86.6)
Treasury stock, at cost:			
Balance at beginning of period	$ (221.3)	$ (205.6)	$ (15.2)
Net shares surrendered under equity-based compensation plans	(13.2)	(15.7)	(15.4)
Repurchase of common stock	—	—	(175.0)
Balance at end of period	$ (234.5)	$ (221.3)	$ (205.6)
Total stockholders' equity	$ 836.3	$ 1,756.8	$ 1,647.9

See notes to consolidated financial statements.

1. BACKGROUND AND DESCRIPTION OF THE BUSINESS

CommScope Holding Company, Inc., along with its direct and indirect subsidiaries (CommScope or the Company), is a global provider of infrastructure solutions for communication and entertainment networks. The Company's solutions for wired and wireless networks enable service providers including cable, telephone and digital broadcast satellite operators and media programmers to deliver media, voice, Internet Protocol (IP) data services and Wi-Fi to their subscribers and allow enterprises to experience constant, wireless and wired connectivity across complex and varied networking environments. The Company's solutions are complemented by a broad array of services including technical support, systems design and integration. CommScope is a leader in digital video and IP television distribution systems, broadband access infrastructure platforms and equipment that delivers data and voice networks to homes. CommScope's global leadership position is built upon innovative technology, broad solution offerings, high-quality and cost-effective customer solutions, and global manufacturing and distribution scale.

On April 4, 2019, the Company completed the acquisition of ARRIS International plc (ARRIS) (the Acquisition) in an all-cash transaction with a total purchase price of approximately $7.7 billion, including debt assumed. The results of operations of ARRIS' products and services are reflected in the new reporting segments of Customer Premises Equipment (CPE), Network and Cloud (N&C) and Ruckus Networks (Ruckus). The Company borrowed approximately $7.0 billion, issued $1.0 billion in Series A Convertible Preferred Stock (the Convertible Preferred Stock) and used cash on hand to fund the Acquisition and related costs. See Note 3 for additional discussion of the Acquisition, Note 8 for additional discussion of the debt financing transactions and Note 14 for additional discussion of the Convertible Preferred Stock.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Consolidation

The accompanying consolidated financial statements include CommScope Holding Company, Inc., along with its direct and indirect subsidiaries. All intercompany accounts and transactions are eliminated in consolidation.

The Acquisition was accounted for using the acquisition method of accounting and the ARRIS results of operations are reported in the Company's audited consolidated financial statements from April 4, 2019, the date of acquisition, through December 31, 2019.

Certain prior year amounts have been reclassified to conform to the current year presentation.

Use of Estimates in the Preparation of the Financial Statements

The preparation of the accompanying consolidated financial statements in conformity with accounting principles generally accepted in the United States (U.S.) requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. These estimates and their underlying assumptions form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other objective sources. The Company bases its estimates on historical experience and on assumptions that are believed to be reasonable under the circumstances and revises its estimates, as appropriate, when events or changes in circumstances indicate that revisions may be necessary. Significant accounting estimates reflected in the Company's financial statements include the allowance for doubtful accounts; reserves for sales returns, discounts, allowances, rebates and distributor price protection programs; inventory excess and obsolescence reserves; product warranty reserves and other contingent liabilities; tax valuation allowances; liabilities for unrecognized tax benefits; purchase price allocations; impairment reviews for investments, property, plant and equipment, goodwill and other intangibles; and pension and other postretirement benefit costs and liabilities. Although these estimates are based on management's knowledge of and experience with past and current events and on management's assumptions about future events, it is at least reasonably possible that they may ultimately differ materially from actual results.

Cash and Cash Equivalents

Cash and cash equivalents represent deposits in banks and cash invested temporarily in various instruments with a maturity of three months or less at the time of purchase.

Accounts Receivable and Allowance for Doubtful Accounts

Accounts receivable are stated at the amount owed by the customer, net of allowances for estimated doubtful accounts, discounts, returns and rebates. The Company maintains allowances for doubtful accounts for estimated losses expected to result from the inability of its customers to make required payments. These estimates are based on management's evaluation of the ability of customers to make payments, focusing on historical experience, known customer financial difficulties and the age of receivable balances. Accounts receivable are charged to the allowance when determined to be no longer collectible. The Company does not offer extended payment terms to customers and as a result amounts owed are not adjusted for the effects of any significant financing component.

Inventories

Inventories are stated at the lower of cost or net realizable value. Inventory cost is determined on a first-in, first-out (FIFO) basis. Costs such as idle facility expense, excessive scrap and re-handling costs are expensed as incurred. The Company maintains reserves to reduce the value of inventory to the lower of cost or net realizable value, including reserves for excess and obsolete inventory.

Long-Lived Assets

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Upon application of acquisition accounting, property, plant and equipment are measured at estimated fair value as of the acquisition date to establish a new historical cost basis. Provisions for depreciation are based on estimated useful lives of the assets using the straight-line method. Useful lives generally range from 10 to 35 years for buildings and improvements and 3 to 10 years for machinery and equipment. Expenditures for repairs and maintenance are expensed as incurred. Assets that management intends to dispose of and that meet held for sale criteria are carried at the lower of the carrying value or fair value less costs to sell.

Goodwill and Other Intangible Assets

Goodwill is assigned to reporting units based on the difference between the purchase price as allocated to the reporting units and the estimated fair value of the identified net assets acquired as allocated to the reporting units. Purchased intangible assets with finite lives are carried at their estimated fair values at the time of acquisition less accumulated amortization and any impairment charges. Amortization is recognized on a straight-line basis over the estimated useful lives of the respective assets.

Asset Impairments

Goodwill is tested for impairment annually or at other times if events have occurred or circumstances exist that indicate the carrying value of the reporting unit may exceed its fair value. Property, plant and equipment and intangible assets with finite lives are reviewed for impairment whenever events or changes in circumstances indicate that the carrying value of the assets may not be recoverable, based on the undiscounted cash flows expected to be derived from the use and ultimate disposition of the assets. Assets identified as impaired are carried at estimated fair value. Equity investments without readily determinable fair values are evaluated each reporting period for impairment based on a qualitative assessment and are then measured at fair value if an impairment is determined to exist. See Notes 4 and 10 for discussion of asset impairment charges.

Income Taxes

Deferred income taxes reflect the future tax consequences of differences between the financial reporting and tax basis of assets and liabilities. The Company records a valuation allowance, when appropriate, to reduce deferred tax assets to an amount that is more likely than not to be realized.

Tax benefits that result from uncertain tax positions may be recognized only if they are considered more likely than not to be sustainable, based on their technical merits. The amount of benefit to be recognized is the largest amount of tax benefit that is at least 50% likely to be realized.

In addition, the Company does not provide for U.S. taxes related to the foreign currency remeasurement gains and losses on its long-term intercompany loans with foreign subsidiaries. These loans are not expected to be repaid in the foreseeable future, and the foreign currency gains and losses are therefore recorded to accumulated other comprehensive loss.

Revenue Recognition

The Company recognizes revenue based on the satisfaction of distinct obligations to transfer goods and services to customers. The Company’s revenue is generated primarily from product or equipment sales. The Company also generates revenue from custom design and installation services as well as bundled sales arrangements that include product, software and services. Revenue is recognized when performance obligations in a contract are satisfied through the transfer of control of the good or service at the amount of consideration expected to be received. The following are required before revenue is recognized:

- Identify the contract with the customer. A variety of arrangements are considered contracts; however, contracts typically take the form of a master purchase agreement or customer purchase orders.
- Identify the performance obligations in the contract. Performance obligations are identified as promised goods or services that are distinct within an arrangement.
- Determine the transaction price. The transaction price is the amount of consideration the Company expects to receive in exchange for transferring the promised goods or services. The consideration may include fixed or variable amounts or both.
- Allocate the transaction price to the performance obligations. The transaction price is allocated to the performance obligations on a relative standalone selling price basis.
- Recognize revenue as the performance obligations are satisfied. Revenue is recognized when transfer of control of the promised goods or services has occurred. This is either at a point in time or over time.

Product sales represent over 90% of the Company’s revenue. For these sales, revenue is recognized when control of the product has transferred to the customer, which is generally at the point in time when products have been shipped, right to payment has been obtained and risk of loss has been transferred. Certain of the Company’s product performance obligations include proprietary operating system software, which typically is not considered separately identifiable. Therefore, sales of these products and the related software are considered one performance obligation.

License contracts include revenue recognized for the licensing of intellectual property, including software, sold separately without products. Functional intellectual property licenses do not meet the criteria for revenue to be recognized over time and revenue is most commonly recognized upon delivery of the license/software to the customer.

Certain customer transactions may be project based and include multiple performance obligations based on the bundling of equipment, software and services. When a multiple performance obligation arrangement exists, the transaction price is allocated to the performance obligations based on their relative standalone selling price, and revenue is recognized upon transfer of control of each deliverable. To determine the standalone selling price, the Company first looks to establish the standalone selling price through an observable price when the good or service is sold separately in similar circumstances. If the standalone selling price cannot be established through an observable price, the Company will make an estimate based on market conditions, customer specific factors and customer class. The Company may use a combination of approaches to estimate the standalone selling price.

For performance obligations recognized over time, judgment is required to evaluate assumptions, including the total estimated costs to determine progress towards completion of the performance obligation and to calculate the corresponding amount of revenue to recognize. If estimated total costs on any contract are greater than the net contract revenues, the entire estimated costs are recorded in the period in which the revisions to estimates are identified and the amounts can be reasonably estimated.

Other customer contract types include a variety of post-contract support services offerings, including:

- Maintenance and support services provided under annual service-level agreements with the Company’s customers. These services represent stand-ready obligations that are recognized over time (on a straight-line basis over the contract period) because the customer simultaneously receives and consumes the benefits of the services as the services are performed.
- Professional services and other similar services consist primarily of “Day 2” services to help customers maximize their utilization of deployed systems. The services are recognized over time because the customer simultaneously receives and consumes the benefits of the service as the services are performed.
- Installation services relate to the routine installation of equipment ordered by the customer at the customer’s site and are distinct performance obligations from delivery of the related hardware. The associated revenues are recognized over time as the services are provided.

Revenue is measured based on the consideration the Company expects to be entitled based on customer contracts. For sales to distributors, system integrators and value-added resellers, revenue is adjusted for variable consideration amounts, including but not limited to estimated discounts, returns, rebates and distributor price protection programs. These estimates are determined based upon historical experience, contract terms, inventory levels in the distributor channel and other related factors. Adjustments to variable consideration estimates are recorded when circumstances indicate revisions may be necessary.

A contract liability for deferred revenue is recorded when consideration is received or is unconditionally due from a customer prior to transferring control of goods or services to the customer under the terms of a contract. Deferred revenue balances typically result from advance payments received from customers for product contracts or from billings in excess of revenue recognized on project or services arrangements.

Unbilled receivables are recorded when revenues are recognized in advance of invoice issuance. A contract asset is any portion of unbilled receivables for which the right to consideration is conditional on a factor other than the passage of time, which is common for certain project contract performance obligations. These assets are presented on a combined basis with accounts receivable and are converted to accounts receivable once the Company’s right to the consideration becomes unconditional, which varies by contract but is generally based on achieving certain acceptance milestones. The Company recognizes the incremental costs of obtaining a contract as an expense when incurred if the amortization period of the asset would be one year or less.

The Company includes shipping and handling costs billed to customers in net sales and includes the costs incurred to transport product to customers as well as certain internal handling costs, which relate to activities to prepare goods for shipment, as cost of sales. See discussion of the Company’s voluntary change in accounting principle below. Shipping and handling costs incurred after control is transferred to the customer are accounted for as fulfillment costs and are not accounted for as separate revenue obligations.

Effective April 1, 2019, the Company made a voluntary change in accounting principle related to its classification of internal handling costs to prepare goods for shipment. Historically, the Company presented these handling costs within selling, general and administrative expense (SG&A). Under the new policy, the Company is presenting these expenses within cost of sales in the Consolidated Statements of Operations. The Company believes that this change is preferable as the classification in cost of sales better reflects the costs of generating the related revenue and results in more meaningful presentation of gross margin. Additionally, this presentation enhances the comparability of the Company's financial statements with industry peers and provides more consistency in the treatment of all shipping and handling costs. The accounting policy change was applied retrospectively to all periods presented. There was no change to net income (loss), earnings (loss) per share, retained earnings (accumulated deficit) or cash flows; however, cost of sales increased by $55.0 million and $62.3 million and SG&A decreased by the same amounts for the years ended December 31, 2018 and 2017, respectively. The Company recorded handling costs as a component of cost of sales for the year ended December 31, 2019. The Consolidated Statements of Operations was adjusted to reflect this change; however, there was no other impact on the consolidated financial statements.

Leases

The Company determines if a contract is a lease or contains a lease at inception. Right of use assets related to operating type leases are reported in other noncurrent assets and the present value of remaining lease obligations is reported in accrued and other liabilities and other noncurrent liabilities on the Consolidated Balance Sheets. For the periods presented, CommScope does not have any financing type leases.

Operating lease liabilities are recognized based on the present value of the future minimum lease payments over the lease term at commencement date. The majority of the Company's leases do not provide an implicit rate; therefore, the Company uses the incremental borrowing rates applicable to the economic environment and the duration of the lease, based on the information available at commencement date, in determining the present value of future payments. The right of use asset for operating leases is measured using the lease liability adjusted for the impact of lease payments made prior to commencement, lease incentives received, initial direct costs incurred and any asset impairments. Lease terms may include options to extend or terminate the lease when it is reasonably certain that the option will be exercised. Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term.

The Company remeasures and reallocates the consideration in a lease when there is a modification of the lease that is not accounted for as a separate contract. The lease liability is remeasured when there is a change in the lease term or a change in the assessment of whether the Company will exercise a lease option. The Company assesses right of use assets for impairment in accordance with its long-lived asset impairment policy.

The Company accounts for lease agreements with contractually required lease and non-lease components on a combined basis. Lease payments made for cancellable leases, variable amounts that are not based on an observable index and lease agreements with an original duration of less than twelve months are recorded directly to lease expense.

Tax Collected from Customers

Taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction, which are collected by the Company from customers, are excluded from net sales.

Product Warranties

The Company recognizes a liability for the estimated claims that may be paid under its customer assurance-type warranty agreements to remedy potential deficiencies of quality or performance of the Company’s products. These product warranties extend over various periods, depending on the product subject to the warranty and the terms of the individual agreements. The Company records a provision for estimated future warranty claims as cost of sales based upon the historical relationship of warranty claims to sales and specifically identified warranty issues. The Company bases its estimates on assumptions that are believed to be reasonable under the circumstances and revises its estimates, as appropriate, when events or changes in circumstances indicate that revisions may be necessary. Such revisions may be material.

Advertising Costs

Advertising costs are expensed in the period in which they are incurred. Advertising expense was $39.5 million, $17.3 million and $21.2 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Research and Development

Research and development (R&D) costs are expensed in the period in which they are incurred. R&D costs include materials and equipment that have no alternative future use, depreciation on equipment and facilities currently used for R&D purposes, personnel costs, contract services and reasonable allocations of indirect costs, if clearly related to an R&D activity. Expenditures in the pre-production phase of an R&D project are recorded as R&D expense. However, costs incurred in the pre-production phase that are associated with output actually used in production are recorded in cost of sales. A project is considered finished with pre-production efforts when management determines that it has achieved acceptable levels of scrap and yield, which vary by project. Expenditures related to ongoing production are recorded in cost of sales.

Derivative Instruments and Hedging Activities

CommScope is exposed to risks resulting from adverse fluctuations in commodity prices, interest rates and foreign currency exchange rates. CommScope’s risk management strategy includes the use of derivative financial instruments whenever management determines their use to be reasonable and practical. This strategy does not permit the use of derivative financial instruments for trading or speculation.

The Company uses forward contracts to hedge a portion of its balance sheet foreign exchange re-measurement risk and to hedge certain planned foreign currency expenditures. Unrealized gains and losses resulting from these contracts are recognized in other expense, net and partially offset corresponding foreign exchange gains and losses on the balances and expenditures being hedged. These instruments are not designated as hedges for hedge accounting purposes and are marked to market each period through earnings.

The Company has a hedging strategy to designate certain foreign currency contracts as net investment hedges to mitigate a portion of the foreign currency risk on the euro net investment in a foreign subsidiary. Hedge effectiveness is assessed each quarter based on the net investment in the foreign subsidiary designated as the hedged item and the changes in the fair value of designated foreign currency contracts based on spot rates. For hedges that meet the effectiveness requirements, changes in fair value are recorded as a component of other comprehensive income (loss), net of tax. Amounts excluded from hedge effectiveness at inception under the spot method for designated forward contracts are recognized on a straight-line basis over the life of each contract and for designated cross-currency swap contracts are recognized as interest accrues.

During 2019, the Company implemented a hedging strategy to mitigate a portion of the exposure to changes in cash flows resulting from variable interest rates on the senior secured term loan due 2026 which are based on the one-month LIBOR benchmark rate (see Note 8). Hedge effectiveness is assessed each quarter, and for hedges that meet the effectiveness requirements, changes in fair value are recorded as a component of other comprehensive income (loss), net of tax, and are reclassified to interest expense as interest payments are made on the Company’s variable rate debt.

The Company has elected and documented the use of the normal purchases and sales exception for normal purchase and sales contracts that meet the definition of a derivative financial instrument. See Note 9 for further disclosure related to the derivative instruments and hedging activities.

Foreign Currency Translation

For the years ended December 31, 2019, 2018 and 2017, approximately 41%, 44% and 46%, respectively, of the Company's net sales were to customers located outside the U.S. A portion of these sales were denominated in currencies other than the U.S. dollar, particularly sales from the Company's foreign subsidiaries. The financial position and results of operations of certain of the Company's foreign subsidiaries are measured using the local currency as the functional currency. Revenues and expenses of these subsidiaries have been translated into U.S. dollars at average exchange rates prevailing during the period. Assets and liabilities of these subsidiaries have been translated at the exchange rates as of the balance sheet date. Translation gains and losses are recorded in accumulated other comprehensive loss. Upon sale or liquidation of an investment in a foreign subsidiary, the amount of net translation gains or losses that have been accumulated in other comprehensive loss attributable to that investment are reported as a gain or loss in earnings in the period in which the sale or liquidation occurs. During the year ended December 31, 2018, the Company liquidated a foreign subsidiary and recognized $14.0 million in translation losses in other expense, net that had been in accumulated other comprehensive loss.

Aggregate foreign currency gains and losses, such as those resulting from the settlement of receivables or payables, foreign currency contracts and short-term intercompany advances in a currency other than the subsidiary's functional currency, are recorded currently in earnings (included in other expense, net) and resulted in losses of $11.8 million, $15.9 million and $8.7 million during the years ended December 31, 2019, 2018 and 2017, respectively. Foreign currency remeasurement gains and losses related to certain long-term intercompany loans that are not expected to be settled in the foreseeable future and the effective portion of foreign currency contracts designated as net investment hedges are recorded in accumulated other comprehensive loss. See Note 9 for disclosure of foreign currency gains and losses specifically related to foreign currency contracts.

Equity-Based Compensation

The estimated fair value of stock awards is recognized as expense over the requisite service periods. Forfeitures of stock awards are recognized as they occur. The Company records deferred tax assets related to compensation expense for awards that are expected to result in future tax deductions for the Company, based on the amount of compensation cost recognized and the Company's statutory tax rate in the jurisdiction in which it expects to receive a deduction. Differences between the deferred tax assets recognized for financial reporting purposes and actual tax deductions reported on the Company's income tax return are recorded in the Consolidated Statements of Operations within income tax expense.

Earnings (Loss) Per Share

Basic earnings (loss) per share (EPS) is computed by dividing net income (loss), less any dividends and deemed dividends related to the Convertible Preferred Stock, by the weighted average number of common shares outstanding during the period. The numerator in diluted EPS is based on the basic EPS numerator adjusted to add back any dividends and deemed dividends related to the Convertible Preferred Stock, subject to antidilution requirements. The denominator used in diluted EPS is based on the basic EPS computation plus the effect of potentially dilutive common shares related to the Convertible Preferred Stock and equity-based compensation plans, subject to antidilution requirements.

For the years ended December 31, 2019, 2018 and 2017, 11.2 million, 2.1 million and 1.5 million shares, respectively, of outstanding equity-based compensation awards were not included in the computation of diluted EPS because the effect was either antidilutive or the performance conditions were not met. Of those amounts, for the year ended December 31, 2019, 2.4 million shares would have been considered dilutive if the Company had not been in a net loss position.

(In millions, unless otherwise noted)

For the year ended December 31, 2019, 27.0 million of as-if converted shares related to the Convertible Preferred Stock were excluded from the diluted share count because they were anti-dilutive; however, they would have been considered dilutive if the Company had not been in a net loss position.

The following table presents the basis for the earnings (loss) per share computations:

	Year Ended December 31,		
	2019	2018	2017
Numerator:			
Net income (loss) for basic and diluted earnings (loss) per share	$ (929.5)	$ 140.2	$ 193.8
Dividends on Series A convertible preferred stock	(40.7)	—	—
Deemed dividends on Series A convertible preferred stock	(3.0)	—	—
Net income (loss) attributable to common stockholders	$ (973.2)	$ 140.2	$ 193.8
Denominator:			
Weighted average common shares outstanding - basic	193.7	192.0	192.4
Dilutive effect of as-if converted Series A convertible preferred stock	—	—	—
Dilutive effect of equity-based awards	—	3.3	4.4
Weighted average common shares outstanding - diluted	193.7	195.3	196.8
Earnings (loss) per share:			
Basic	$ (5.02)	$ 0.73	$ 1.01
Diluted	$ (5.02)	$ 0.72	$ 0.98

Business Combinations

The Company uses the acquisition method of accounting for business combinations which requires the tangible and intangible assets acquired and liabilities assumed to be recorded at their respective fair market value as of the acquisition date. Goodwill represents the excess of the consideration transferred over the fair value of the net assets acquired. The fair values of the assets acquired and liabilities assumed are determined based upon the Company's valuation and involves making significant estimates and assumptions based on facts and circumstances that existed as of the acquisition date. The Company uses a measurement period following the acquisition date to gather information that existed as of the acquisition date that is needed to determine the fair value of the assets acquired and liabilities assumed. The measurement period ends once all information is obtained, but no later than one year from the acquisition date.

Concentrations of Risk

Non-derivative financial instruments used by the Company in the normal course of business include letters of credit and commitments to extend credit, primarily accounts receivable. The Company generally does not require collateral on its accounts receivable. These financial instruments involve risk, including the credit risk of nonperformance by the counterparties to those instruments, and the actual loss may exceed the reserves provided in the Company's Consolidated Balance Sheets. See Note 17 for further discussion of customer-related concentrations of risk.

The Company manages its exposures to credit risk associated with accounts receivable using such tools as credit approvals, credit limits and monitoring procedures. CommScope estimates the allowance for doubtful accounts based on the actual payment history and individual circumstances of significant customers as well as the age of receivables. In management's opinion, as of December 31, 2019, the Company did not have significant unreserved risk of credit loss due to the non-performance of customers or other counterparties related to amounts receivable. However, an adverse change in financial condition of a significant customer or group of customers or in the telecommunications industry could materially affect the Company's estimates related to doubtful accounts.

The principal raw materials purchased by CommScope (aluminum, bimetals, copper, optical fiber, plastics and other polymers and steel) are subject to changes in market price as these materials are linked to various commodity markets. The Company attempts to mitigate these risks through effective requirements planning and by working closely with its key suppliers to obtain the best possible pricing and delivery terms.

The Company relies on sole suppliers or a limited group of suppliers for certain key components (memory and chip capacitors), subassemblies and modules and a limited group of contract manufacturers to manufacture a significant portion of its products. Any disruption or termination of these arrangements could have a material adverse impact on the Company's results of operations.

Recent Accounting Pronouncements

Adopted in 2019

On January 1, 2019, the Company adopted ASU No. 2016-02, *Leases*, and all subsequently issued clarifying guidance. Under the new guidance, lessees are required to recognize assets and lease liabilities for the rights and obligations created by leased assets previously classified as operating leases. In July 2018, the FASB issued ASU No. 2018-11, which permitted entities to record the impact of adoption using a modified retrospective method with any cumulative-effect as an adjustment to retained earnings (accumulated deficit) as opposed to restating comparative periods for the effects of applying the new standard. The Company elected this transition approach; therefore, the Company's prior period reported results are not restated to include the impact of this adoption. In addition, the Company elected the package of three transition practical expedients which alleviate the requirement to reassess embedded leases, lease classification and initial direct costs for leases commencing prior to the adoption date.

The adoption effect of the new guidance increased total assets and total liabilities in the Consolidated Balance Sheets by $98.8 million as of January 1, 2019 due to the addition of right-of-use assets and lease obligations for operating type leases, net of the elimination of existing prepaid rent, deferred rent and lease termination cost amounts. The adoption of the new standard did not materially affect the Consolidated Statements of Operations; and therefore, no cumulative effect adjustment was recorded. Adoption of the new standard also did not materially affect the Consolidated Statements of Cash Flows. See Note 5 for further discussion of the Company's leasing activities.

On January 1, 2019, the Company adopted ASU No. 2017-04, *Simplifying the Test of Goodwill Impairment*, which eliminates Step 2 from the goodwill impairment test. Under the new guidance, the Company performs its annual or interim goodwill impairment test by comparing the fair value of a reporting unit with its carrying amount and recognizing a goodwill impairment charge for the excess of the reporting unit's carrying amount over its fair value, up to the amount of goodwill allocated to that reporting unit. The new guidance was applied to the goodwill impairment tests performed in 2019.

On January 1, 2019, the Company adopted ASU No. 2018-15, *Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement (CCA) that is a Service Contract*. The new guidance aligns the accounting for costs incurred to implement a CCA that is a service arrangement with the guidance on capitalizing costs associated with developing or obtaining internal-use software. Adoption of the new standard did not materially impact the Company's consolidated financial statements.

Issued but Not Adopted

In December 2019, the FASB issued ASU No. 2019-12, *Simplifying the Accounting for Income Taxes*. The new guidance simplifies the accounting for income taxes by removing certain exceptions to the general principles in Accounting Standards Codification (ASC) Topic 740 and improves consistent application of and simplifies GAAP for other areas of ASC Topic 740 by clarifying and amending existing guidance. ASU No. 2019-12 is effective for the Company January 1, 2021 and early adoption is permitted. The Company is evaluating the impact of the new guidance on the consolidated financial statements.

(In millions, unless otherwise noted)

In June 2016, the FASB issued ASU No. 2016-13, *Measurement of Credit Losses on Financial Instruments*, and also issued subsequent amendments to the initial guidance: ASU 2018-19, ASU 2019-04, ASU 2019-05, ASU 2019-10 and ASU 2019-11 (collectively, ASC Topic 326). The new guidance replaces the current incurred loss method used for determining credit losses on financial assets, including trade receivables, with an expected credit loss method. ASC Topic 326 is effective for the Company as of January 1, 2020. The Company is continuing to assess and evaluate assumptions and models to estimate losses. Upon adoption of the guidance, the Company will be required to record a cumulative effect adjustment to retained earnings (accumulated deficit) for the impact as of the date of adoption. As credit losses from the Company's trade receivables have not historically been significant, the Company anticipates that the adoption of ASC Topic 326 will not materially impact the consolidated financial statements.

3. ACQUISITIONS

ARRIS

On April 4, 2019, the Company acquired all of the issued ordinary shares of ARRIS in an all cash transaction with a total consideration of approximately $7.7 billion, including debt assumed. ARRIS is a global leader in entertainment, communications and networking technology. The combined company is expected to shape the future of wired and wireless communications and benefit from key industry trends, including network convergence, fiber and mobility everywhere, 5G, Internet of Things and rapidly changing network and technology architectures. For the year ended December 31, 2019, net sales of $4.0 billion and an operating loss of $863.6 million, was included in the Consolidated Statements of Operations related to the ARRIS business. For the year ended December 31, 2019, the Company recorded $195.3 million of transaction and integration costs related to the Acquisition and these costs were recognized in SG&A in the Consolidated Statements of Operations.

The following amounts represent the preliminary determination of the fair value of identifiable assets acquired and liabilities assumed from the Acquisition. The final determination of the fair value of certain assets and liabilities will be completed within the one-year measurement period from the date of acquisition as required by ASC Topic 805, *Business Combinations.* As of December 31, 2019, the valuation studies necessary to determine the fair market value of the assets acquired and liabilities assumed are preliminary, including the validation of the underlying cash flows used to determine the fair value of the identified intangible assets. The size and breadth of the Acquisition necessitates use of the one-year measurement period to adequately analyze all the factors used in establishing the asset and liability fair values as of the acquisition date, including, but not limited to, intangible assets, inventory, real property, leases, deferred tax assets and liabilities, certain reserves and the related tax impacts of any adjustments. Any potential adjustments could be material in relation to the preliminary values presented below:

	Amounts Recognized as of Acquisition Date	Q3 Measurement Period Adjustments	Q4 Measurement Period Adjustments	Amounts Recognized as of Acquisition Date (as adjusted)
Assets				
Cash and cash equivalents	$ 556.1	$ —	$ —	$ 556.1
Accounts receivable	1,151.8	3.2	—	1,155.0
Inventory	1,063.4	—	(67.9)	995.5
Other current assets	131.0	1.0	—	132.0
Property, plant and equipment	328.2	(4.5)	(7.1)	316.6
Goodwill	2,894.6	(9.0)	105.6	2,991.2
Identifiable intangible assets	3,542.8	—	(33.2)	3,509.6
Other noncurrent assets	463.6	(14.7)	(1.2)	447.7
Less: Liabilities assumed				
Current liabilities	(1,505.9)	17.1	(26.2)	(1,515.0)
Debt	(2,052.0)	—	—	(2,052.0)
Other noncurrent liabilities	(959.3)	10.4	30.0	(918.9)
Net acquisition cost	$ 5,614.3	$ 3.5	$ —	$ 5,617.8

(In millions, unless otherwise noted)

The Company recorded measurement period adjustments on a prospective basis since the acquisition date. During the fourth quarter of 2019, the Company recorded measurement period adjustments decreasing intangible assets and inventory by $33.2 million and $67.9 million, respectively, with a corresponding offset to goodwill as a result of the progression of analysis regarding the fair value of the assets and estimated useful lives of the intangibles. Although these adjustments did not have an impact on the Consolidated Statements of Operations for the year ended December 31, 2019, had these adjustments been recorded as of the acquisition date, the interim period impacts on the Consolidated Statements of Operations for 2019 would have been as follows:

- Amortization expense for the second, third and fourth quarters of 2019 would have increased (decreased) by $(23.8) million, $(23.7) million and $47.5 million, respectively.
- Cost of sales for the second, third, and fourth quarters of 2019 would have increased (decreased) by $(14.5) million, $(9.9) million, and $24.4 million, respectively.

The impact of other measurement period adjustments to the Consolidated Statements of Operations was not material to the year ended December 31, 2019 or the interim periods within.

The fair value of net accounts receivable was $1,155.0 million with a gross contractual amount of $1,176.5 million. The Company expects $21.5 million to be uncollectible. The debt of $2,052.0 million was repaid on April 4, 2019. Total consideration excludes $131.1 million related to the cash settlement of outstanding unvested ARRIS equity compensation awards. These cash settled equity awards were recorded as transaction costs during the year ended December 31, 2019 and are included in SG&A in the Consolidated Statements of Operations.

The Company uses the acquisition method of accounting for business combinations which requires the tangible and intangible assets acquired and liabilities assumed to be recorded at their respective fair market value as of the acquisition date. For accounting and financial reporting purposes, fair value is defined under ASC Topic 820, *Fair Value Measurements and Disclosures* as the price that would be received upon sale of an asset or the amount paid to transfer a liability in an orderly transaction between market participants at the measurement date. Market participants are assumed to be buyers and sellers in the principal (most advantageous) market for the asset or liability. Additionally, fair value measurements for an asset assume the highest and best use of that asset by market participants. Use of different estimates and judgments could yield different results. In determining the fair value of identifiable assets acquired and liabilities assumed, a review was conducted for any significant contingent assets or liabilities existing as of the acquisition date.

The goodwill arising from the Acquisition is believed to result from ARRIS' reputation in the marketplace and assembled workforce and is not expected to be deductible for income tax purposes.

Various valuation techniques were used to estimate the fair value of the assets acquired and the liabilities assumed which use significant unobservable inputs, or Level 3 inputs as defined by the fair value hierarchy. Using these valuation approaches requires the Company to make significant estimates and assumptions. The estimated fair values may change as the Company completes its valuation analyses of the assets acquired and liabilities assumed in the first quarter of 2020.

The table below summarizes the preliminary valuations of the intangible assets acquired that were determined by management to meet the criteria for recognition apart from goodwill and determined to have finite lives. The values presented below are preliminary estimates and are subject to change as management completes its valuation of the Acquisition.

	Estimated Fair Value	Weighted Average Estimated Useful Life (in years)
Customer contracts and relationships	$ 1,595.0	17
Trademarks	414.0	13
Patents and technologies	1,442.6	5
Backlog	58.0	0.5
Total amortizable intangible assets	$ 3,509.6	

The amounts related to ARRIS included in the following unaudited pro forma information are based on their historical results and, therefore, may not be indicative of the actual results when operated as part of CommScope. The pro forma adjustments represent management's best estimates based on information available at the time the pro forma information was prepared and may differ from the adjustments that may actually have been required. Accordingly, the unaudited pro forma financial information should not be relied upon as being indicative of the results that would have been realized had the Acquisition occurred as of the date indicated or that may be achieved in the future.

The following table presents the unaudited pro forma consolidated results of operations for CommScope for the years ended December 31, 2019 and 2018 as though the Acquisition had been completed as of January 1, 2018 (in millions, except per share amounts):

	Year Ended December 31, 2019	Year Ended December 31, 2018
Net sales	$ 9,782.1	$ 11,260.3
Net loss attributable to common stockholders	(749.0)	(486.7)
Net loss per diluted share	$ (3.87)	$ (2.53)

These unaudited pro forma results reflect adjustments for net interest expense for the debt related to the Acquisition; depreciation expense for property, plant and equipment that has been marked up to its estimated fair value; amortization for intangible assets with finite lives identified separate from goodwill; equity-based compensation for equity awards issued to ARRIS employees; and the related income tax impacts of these adjustments.

The unaudited pro forma results for the year ended December 31, 2019 were adjusted to exclude certain non-recurring transaction and integration costs, acquisition accounting adjustments related to the markup of inventory to its estimated fair value and deferred revenue, and the related income tax impacts. The unaudited pro forma results for the year ended December 31, 2018 were adjusted to include the impact of these items. These adjustments in the aggregate on a pre-tax basis were $441.2 million and $(444.3) million and for the years ended December 31, 2019 and 2018, respectively.

Cable Exchange

On August 1, 2017, the Company acquired Cable Exchange in an all-cash transaction. The Company paid $108.7 million ($105.2 million net of cash acquired) in 2017 and $11.0 million in 2019. As of December 31, 2019, the Company had $3.5 million payable in 2020 to complete the transaction. Cable Exchange is a quick-turn supplier of fiber optic and copper assemblies for data, voice and video communications. Net sales of Cable Exchange products are included in the CCS segment for the years ended December 31, 2019, 2018 and 2017 and were not material.

The allocation of the purchase price, based on estimates of the fair values of the assets acquired and liabilities assumed, is as follows (in millions):

	Estimated Fair Value
Assets	
Cash and cash equivalents	$ 3.5
Accounts receivable	6.4
Inventory	4.4
Property, plant and equipment	0.9
Goodwill	49.6
Identifiable intangible assets	61.1
Less: Liabilities assumed	(2.7)
Net acquisition cost	$ 123.2

(In millions, unless otherwise noted)

The goodwill arising from the purchase price allocation of the Cable Exchange acquisition is believed to result from the company's reputation in the marketplace and assembled workforce and is expected to be deductible for income tax purposes.

4. GOODWILL AND OTHER INTANGIBLE ASSETS

The following table presents details of the Company's intangible assets other than goodwill as of December 31, 2019 and 2018:

	2019			2018		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Customer base	$ 3,503.3	$ 1,318.8	$ 2,184.5	$ 1,911.2	$ 1,103.5	$ 807.7
Trade names and trademarks	1,021.9	308.3	713.6	608.4	249.3	359.1
Patents and technologies	2,021.6	656.1	1,365.5	582.9	397.7	185.2
Other	58.3	58.3	—	0.3	0.3	—
Total intangible assets	$ 6,605.1	$ 2,341.5	$ 4,263.6	$ 3,102.8	$ 1,750.8	$ 1,352.0

There were no impairments of definite-lived intangible assets identified during the years ended December 31, 2019, 2018 or 2017.

The Company's finite-lived intangible assets are being amortized on a straight-line basis over the weighted-average amortization periods in the following table. The aggregate weighted-average amortization period is 11.6 years.

	Weighted-Average Amortization Period (in years)
Customer base	13.8
Trade names and trademarks	16.3
Patents and technologies	5.9

Amortization expense for intangible assets was $593.2 million, $264.6 million and $271.0 million for the years ended December 31, 2019, 2018 and 2017, respectively. Estimated amortization expense for the next five years is as follows:

	Estimated Amortization Expense
2020	$ 630.1
2021	610.4
2022	544.2
2023	495.2
2024	438.6

(In millions, unless otherwise noted)

The following table presents goodwill by reportable segment:

	Connectivity	Mobility	CPE	N&C	Ruckus	Total
Goodwill, gross, as of December 31, 2016	$ 2,077.5	$ 901.8	$ —	$ —	$ —	2,979.3
Acquisitions	49.6	—	—	—	—	49.6
Foreign exchange	66.1	2.6	—	—	—	68.7
Goodwill, gross, as of December 31, 2017	2,193.2	904.4	—	—	—	3,097.6
Foreign exchange	(31.6)	(2.7)	—	—	—	(34.3)
Goodwill, gross, as of December 31, 2018	2,161.6	901.7	—	—	—	3,063.3
Preliminary acquisition allocation	—	—	402.9	2,171.2	417.0	2,991.1
Foreign exchange and other	3.5	1.7	(0.8)	—	—	4.4
Goodwill, gross, as of December 31, 2019	2,165.1	903.4	402.1	2,171.2	417.0	6,058.8
Accumulated impairment charges as of December 31, 2017 and 2018	(51.5)	(159.5)	—	—	—	(211.0)
Impairment charges for year ended December 31, 2019	—	—	(192.8)	(142.1)	(41.2)	(376.1)
Accumulated impairment charges as of December 31, 2019	(51.5)	(159.5)	(192.8)	(142.1)	(41.2)	(587.1)
Goodwill, net, as of December 31, 2019	$ 2,113.6	$ 743.9	$ 209.3	$ 2,029.1	$ 375.8	$ 5,471.7

During the first quarter of 2019, the Company assessed goodwill for impairment due to a change in reporting units in the Connectivity segment. As a result, the Company performed impairment testing for goodwill under the Connectivity segment reporting unit structure immediately before the change and determined that no impairment existed. The Company reallocated goodwill to the new reporting units and performed impairment testing for goodwill immediately after the change and determined no impairment existed. During the second quarter of 2019, the Company determined that indicators of possible goodwill impairment existed for the reporting units from the acquired ARRIS business. Since the closing of the Acquisition on April 4, 2019, the ARRIS reporting units (CPE, N&C and Ruckus) had experienced challenges that impacted the Company's performance. These challenges included declines in spending by cable operator customers that resulted in declines in net sales and operating income for these reporting units and the loss of key leaders of these reporting units following the Acquisition. Certain of these challenges were expected to persist throughout the remainder of 2019 and were expected to impact management's ability to grow these businesses at the rate that was originally estimated when the Acquisition was closed. The Company performed goodwill impairment testing during the second quarter of 2019 and determined that no impairment existed. No indicators of goodwill impairment were identified in the third quarter of 2019.

As a result of the annual impairment test performed in the fourth quarter of 2019, the Company recorded goodwill impairment charges totaling $376.1 million, of which $192.8 million related to the CPE reporting unit, $142.1 million related to the N&C reporting unit and $41.2 million related to the Ruckus reporting unit. These reporting units were acquired in the ARRIS acquisition on April 4, 2019 (see Note 3). During the Company's annual strategic planning process in the fourth quarter of 2019, several factors arose, including an assessment of historical and future operating results, key customer inputs, new assessments of market trends and anticipated expenditures required to support the changing market dynamics affecting each of the ARRIS reporting units. As a result of these factors, the Company concluded that the fair value of each of these reporting units was less than its carrying value. The goodwill impairment expense was recorded in the asset impairments line on the Consolidated Statement of Operations.

Estimating the fair value of a reporting unit involves uncertainties because it requires management to develop numerous assumptions, including assumptions about the future growth and potential volatility in revenues and costs, capital expenditures, industry economic factors and future business strategy. Changes in projected revenue growth rates, projected operating income margins or estimated discount rates due to uncertain market conditions, loss of one or more key customers, changes in the Company's strategy, changes in technology or other factors could negatively affect the fair value in one or more of the Company's reporting units and result in a material impairment charge in the future.

(In millions, unless otherwise noted)

5. REVENUE FROM CONTRACTS WITH CUSTOMERS

Disaggregated Net Sales

The following table presents net sales by reportable segment, disaggregated based on contract type:

	Year Ended December 31, 2019											
	Connectivity		Mobility		CPE		N&C		Ruckus		Total	
	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019	2018
Contract type:												
Product contracts	$2,550.1	$2,803.5	$1,677.3	$1,662.3	$2,522.8	$ —	$ 847.8	$ —	$376.9	$ —	$7,974.9	$4,465.8
Project contracts	0.2	0.8	45.0	49.5	—	—	19.4	—	—	—	64.6	50.3
Other contracts	7.1	8.4	31.9	44.0	16.2	—	206.4	—	44.0	—	305.6	52.4
Consolidated net sales	$2,557.4	$2,812.7	$1,754.2	$1,755.8	$2,539.0	$ —	$1,073.6	$ —	$420.9	$ —	$8,345.1	$4,568.5

Further information on net sales by reportable segment and geographic region is included in Note 17.

Allowance for Doubtful Accounts

	Year ended December 31,		
	2019	2018	2017
Allowance for doubtful accounts, beginning of period	$ 17.4	$ 14.0	$ 17.2
Charged to costs and expenses	10.6	6.0	1.3
Account write-offs and other	7.4	(2.6)	(4.5)
Allowance for doubtful accounts, end of period	$ 35.4	$ 17.4	$ 14.0

Customer Contract Balances

The following table provides the balance sheet location and amounts of contract assets and liabilities from contracts with customers as of December 31, 2019 and December 31, 2018.

		December 31,	
	Balance Sheet Location	2019	2018
Unbilled accounts receivable	Accounts receivable, less allowance for doubtful accounts	$ 28.6	$ 3.1
Deferred revenue	Accrued and other liabilities and Other noncurrent liabilities	122.2	7.6

There were no material changes to contract asset balances for the year ended December 31, 2019 as a result of changes in estimates or impairments. As of December 31, 2019, the aggregate amount of the transaction price allocated to performance obligations that are unsatisfied and that have a duration of one year or less was $82.6 million, with the remaining $39.5 million having a duration greater than one year.

(In millions, unless otherwise noted)

Contract Liabilities

The following table presents the changes in deferred revenue for the year ended December 31, 2019:

	Year Ended December 31, 2019
Balance at beginning of period	$ 7.6
Fair value of deferred revenue acquired in ARRIS acquisition	90.1
Deferral of revenue	124.8
Recognition of unearned revenue	(100.3)
Balance at end of period	$ 122.2

6. LEASES

The Company has operating type leases for real estate, equipment and vehicles both in the U.S. and internationally. As of December 31, 2019, the Company had no finance type leases. The Company's leases have remaining lease terms of up to 10 years, some of which may include options to extend the leases for up to 5 years or options to terminate the leases within 1 year. Operating lease expense was $88.3 million for the year ended December 31, 2019, inclusive of period cost for short-term, cancellable and variable leases, not included in lease liabilities, of $26.7 million for the year ended December 31, 2019.

The Company occasionally subleases all or a portion of certain unutilized real estate facilities. As of December 31, 2019, the Company's sublease arrangements were classified as operating type leases and the income amounts were not material for the year ended December 31, 2019.

Supplemental cash flow information related to operating leases:

	Year Ended December 31, 2019
Operating cash paid to settle lease liabilities	$ 68.4
Right of use asset additions in exchange for lease liabilities	33.7

Supplemental balance sheet information related to operating leases:

	Balance Sheet Location	December 31, 2019
Right of use assets	Other noncurrent assets	$ 222.9
Lease liabilities	Accrued and other liabilities	$ 61.7
Lease liabilities	Other noncurrent liabilities	160.4
Total lease liabilities		$ 222.1

Weighted average remaining lease term (in years)	4.3
Weighted average discount rate	6.7%

(In millions, unless otherwise noted)

Future minimum lease payments under non-cancellable leases as of December 31, 2019 are as follows:

	Operating Leases
2020	74.7
2021	63.8
2022	43.2
2023	33.0
2024	22.2
Thereafter	22.7
Total minimum lease payments	$ 259.6
Less: imputed interest	(37.5)
Total	$ 222.1

7. SUPPLEMENTAL FINANCIAL STATEMENT INFORMATION

Inventories

	December 31,	
	2019	2018
Raw materials	$ 240.1	$ 146.8
Work in process	121.6	98.8
Finished goods	614.2	227.7
	$ 975.9	$ 473.3

Property, Plant and Equipment

	December 31,	
	2019	2018
Land and land improvements	$ 57.4	$ 49.3
Buildings and improvements	333.3	212.2
Machinery and equipment	849.9	597.0
Construction in progress	37.0	30.1
	1,277.6	888.6
Accumulated depreciation	(553.8)	(437.7)
	$ 723.8	$ 450.9

Depreciation expense was $143.7 million, $75.6 million and $81.7 million during the years ended December 31, 2019, 2018 and 2017, respectively. No interest was capitalized during the years ended December 31, 2019, 2018 or 2017.

(In millions, unless otherwise noted)

Accrued and Other Liabilities

	December 31, 2019	December 31, 2018
Compensation and employee benefit liabilities	$ 187.3	$ 94.3
Operating lease liabilities	61.7	—
Accrued interest	97.8	18.5
Deferred revenue	82.6	7.6
Accrued royalties	63.9	1.2
Product warranty accrual	61.0	15.6
Restructuring reserve	24.0	29.9
Income taxes payable	15.8	7.7
Value-added taxes payable	27.3	12.4
Accrued professional fees	32.4	19.3
Patent litigation settlement	55.0	—
Other	153.2	84.9
	$ 862.0	$ 291.4

Accumulated Other Comprehensive Loss

The following table presents changes in accumulated other comprehensive loss (AOCL), net of tax:

	Year Ended December 31, 2019	Year Ended December 31, 2018
Foreign currency translation		
Balance at beginning of period	$ (140.5)	$ (52.8)
Other comprehensive loss	(23.9)	(102.5)
Amounts reclassified from AOCL	1.7	14.8
Balance at end of period	$ (162.7)	$ (140.5)
Hedging instruments		
Balance at beginning of period	$ (1.4)	$ (4.9)
Other comprehensive income (loss)	(7.5)	3.5
Balance at end of period	$ (8.9)	$ (1.4)
Defined benefit plan activity		
Balance at beginning of period	$ (17.3)	$ (28.9)
Other comprehensive loss	(8.4)	(1.7)
Amounts reclassified from AOCL	0.3	13.3
Balance at end of period	$ (25.4)	$ (17.3)
Net AOCL at end of period	$ (197.0)	$ (159.2)

Amounts reclassified from net AOCL related to foreign currency translation and defined benefit plans are recorded in other expense, net in the Consolidated Statements of Operations.

Cash Flow Information

	Year Ended December 31, 2019	2018	2017
Cash paid during the period for:			
Income taxes, net of refunds	$ 120.9	$ 112.1	$ 100.9
Interest	465.2	231.3	216.7

(In millions, unless otherwise noted)

8. FINANCING

	December 31,	
	2019	2018
5.00% senior notes due March 2027	$ 750.0	$ 750.0
8.25% senior notes due March 2027	1,000.0	—
6.00% senior notes due June 2025	1,500.0	1,500.0
5.50% senior notes due June 2024	650.0	650.0
5.00% senior notes due June 2021	150.0	650.0
6.00% senior secured notes due March 2026	1,500.0	—
5.50% senior secured notes due March 2024	1,250.0	—
Senior secured term loan due April 2026	3,192.0	—
Senior secured term loan due December 2022	—	486.3
Senior secured revolving credit facility	—	—
Total principal amount of debt	$ 9,992.0	$ 4,036.3
Less: Original issue discount, net of amortization	(29.2)	(1.5)
Less: Debt issuance costs, net of amortization	(130.4)	(48.9)
Less: Current portion	(32.0)	—
Total long-term debt	$ 9,800.4	$ 3,985.9

Senior Notes

In connection with the Acquisition, in February 2019, CommScope Finance LLC, a wholly owned subsidiary of the Company and an unrestricted subsidiary as defined in the indentures governing the Company’s then-existing senior notes and the credit agreements governing the Company’s then-existing senior secured credit facilities, issued $1.0 billion of 8.25% senior notes due 2027 (the New Unsecured Notes), $1.5 billion of 6.00% senior secured notes due 2026 (the 2026 Secured Notes) and $1.25 billion of 5.50% senior secured notes due 2024 (the 2024 Secured Notes and, together with the 2026 Secured Notes, the Secured Notes; the Secured Notes together with the New Unsecured Notes, the New Notes). The proceeds from the issuance of the New Notes were held in escrow until the closing of the Acquisition on April 4, 2019 and were then used to fund the Acquisition, which also included the repayment of ARRIS’ outstanding debt of $2.1 billion under its senior secured credit facilities. Concurrent with the closing of the Acquisition, CommScope Finance LLC merged with and into CommScope, Inc., with CommScope, Inc., a wholly owned subsidiary of the Company, continuing as the surviving entity, upon which CommScope, Inc. became the issuer of the New Notes by operation of law.

As of December 31, 2019, the Company had outstanding four additional series of senior notes: (1) $750.0 million initial aggregate principal amount of 5.00% senior notes due March 15, 2027 issued by CommScope Technologies LLC (CommScope Technologies), a wholly owned subsidiary of the Company, in March 2017 (the 2027 Notes); (2) $1.5 billion initial aggregate principal amount of 6.00% senior notes due June 15, 2025 issued by CommScope Technologies in June 2015 (the 2025 Notes); (3) $650.0 million initial aggregate principal amount of 5.50% senior notes due 2024 issued by CommScope, Inc. in May 2014 (the 2024 Notes and, together with the 2027 Notes and the 2025 Notes, the CommScope Technologies Notes); and (4) $650.0 million initial aggregate principal amount of 5.00% senior notes due June 15, 2021 issued by CommScope, Inc. in May 2014 (the 2021 Notes and, together with the New Unsecured Notes, the CommScope, Inc. Notes; the Secured Notes, the CommScope Technologies Notes and the CommScope, Inc. Notes, collectively, the Senior Notes).

The indentures governing the Senior Notes contain covenants that restrict the ability of CommScope, Inc. and its restricted subsidiaries to, among other things, incur additional debt, make certain payments, including payment of dividends (except, in the case of the New Notes, with respect to the Convertible Preferred Stock) or repurchases of equity interests of CommScope, Inc. or the applicable issuer, make loans or acquisitions or capital contributions and certain investments, incur certain liens, sell assets, merge or consolidate or liquidate other entities and enter into certain transactions with affiliates.

There are no financial maintenance covenants in the indentures governing the Senior Notes. Events of default under the indentures governing the Senior Notes include, among others, non-payment of principal or interest when due, covenant defaults, bankruptcy and insolvency events and cross acceleration to material debt.

6.00% Senior Secured Notes due 2026 and 5.50% Senior Secured Notes due 2024 (the Secured Notes)

The 2024 Secured Notes mature on March 1, 2024 and the 2026 Secured Notes mature on March 1, 2026. Interest is payable on the Secured Notes semi-annually in arrears on March 1 and September 1 of each year. The Secured Notes are guaranteed on a senior secured basis by the Company and each of CommScope, Inc.'s existing and future wholly owned domestic restricted subsidiaries that is an obligor under the senior secured credit facilities or certain other debt, subject to certain exceptions. The Secured Notes and the related guarantees are secured on a first-priority basis by security interests in all of the assets that secure indebtedness under the 2026 Term Loan on a first-priority basis, and on a second-priority basis in all assets that secure the new asset-based revolving credit facility on a first-priority basis and the 2026 Term Loan on a second-priority basis. The Secured Notes and the related guarantees rank senior in right of payment to all of CommScope, Inc.'s and the guarantors' subordinated indebtedness and equally in right of payment with all of CommScope, Inc.'s and the guarantors' senior indebtedness (without giving effect to collateral arrangements), including the senior secured credit facilities and the other Senior Notes. The Secured Notes and the related guarantees are effectively senior to all of CommScope, Inc.'s and the guarantors' unsecured indebtedness and debt secured by a lien junior to the liens securing the Secured Notes, in each case to the extent of the value of the collateral, and effectively equal to all of CommScope, Inc.'s and the guarantors' senior indebtedness secured on the same priority basis as the Secured Notes, including the 2026 Term Loan. The Secured Notes and the related guarantees are effectively subordinated to any of CommScope, Inc.'s or the guarantors' indebtedness that is secured by assets that do not constitute collateral for the Secured Notes and effectively subordinated to any of CommScope, Inc.'s or the guarantors' indebtedness that is secured by a senior-priority lien, including under the new asset-based revolving credit facility, in each case to the extent of the value of the assets securing such indebtedness. In addition, the Secured Notes and related guarantees are structurally subordinated to all existing and future liabilities (including trade payables) of CommScope, Inc.'s subsidiaries that do not guarantee the Secured Notes.

The Secured Notes may be redeemed prior to maturity under certain circumstances. Upon certain change of control events, the Secured Notes may be redeemed at the option of the holders at 101% of their face amount, plus accrued and unpaid interest. The 2024 Secured Notes may be redeemed on or after March 1, 2022 by CommScope, Inc. at the redemption prices specified in the indenture governing the Secured Notes. Prior to March 1, 2021, the Secured Notes may be redeemed by CommScope, Inc. at a redemption price equal to 100% of their principal amount, plus a make-whole premium (as specified in the indenture governing the Secured Notes), plus accrued and unpaid interest. Prior to March 1, 2021, under certain circumstances, CommScope, Inc. may also redeem up to 40% of the aggregate principal amount of the Secured Notes at a redemption price of 105.50%, with respect to the 2024 Secured Notes, and 106.00%, with respect to the 2026 Secured Notes, in each case plus accrued and unpaid interest, using the proceeds of certain equity offerings.

In connection with issuing the 2024 Secured Notes, the Company incurred costs of $18.4 million during the year ended December 31, 2019, which were recorded as a reduction of the carrying amount of the debt and are being amortized over the term of the 2024 Secured Notes. In connection with issuing the 2026 Secured Notes, the Company incurred costs of $22.0 million during the year ended December 31, 2019, which were recorded as a reduction of the carrying amount of the debt and are being amortized over the term of the 2026 Secured Notes.

8.25% Senior Notes due 2027, 5.50% Senior Notes due 2024 and 5.00% Senior Notes due 2021 (the CommScope, Inc. Notes)

The New Unsecured Notes mature on March 1, 2027, the 2024 Notes mature on June 15, 2024 and the 2021 Notes mature on June 15, 2021. Interest is payable on the New Unsecured Notes semi-annually in arrears on March 1 and September 1 of each year and on the 2024 Notes and the 2021 Notes on June 15 and December 15 of each year. The CommScope, Inc. Notes are guaranteed on a senior unsecured basis by each of CommScope, Inc.'s existing and future wholly owned domestic restricted subsidiaries that is an obligor under the senior secured credit facilities or certain other capital markets debt, subject to certain exceptions. The CommScope, Inc. Notes and the related guarantees rank senior in right of payment to all of CommScope, Inc.'s and the guarantors' subordinated indebtedness and equally in right of payment with all of CommScope, Inc.'s and the guarantors' senior indebtedness (without giving effect to collateral arrangements), including the senior secured credit facilities and the other Senior Notes. The CommScope, Inc. Notes and the related guarantees are effectively junior to all of CommScope, Inc.'s and the guarantors' existing and future secured indebtedness, including the Secured Notes and the senior secured credit facilities, to the extent of the value of the assets securing such secured indebtedness. In addition, the CommScope, Inc. Notes and related guarantees are structurally subordinated to all existing and future liabilities (including trade payables) of CommScope, Inc.'s subsidiaries that do not guarantee the CommScope, Inc. Notes.

The CommScope, Inc. Notes may be redeemed prior to maturity under certain circumstances. Upon certain change of control events, the CommScope, Inc. Notes may be redeemed at the option of the holders at 101% of their principal amount, plus accrued and unpaid interest. The 2021 Notes and the 2024 Notes may be redeemed at the redemption prices specified in the respective indentures governing the 2021 Notes and the 2024 Notes. The New Unsecured Notes may be redeemed by CommScope, Inc. on or after March 1, 2022 at the redemption prices specified in the indenture governing the New Unsecured Notes. Prior to March 1, 2022, the New Unsecured Notes may be redeemed by CommScope, Inc. at a redemption price equal to 100% of their principal amount, plus a make-whole premium (as specified in the indenture governing the New Unsecured Notes), plus accrued and unpaid interest. Prior to March 1, 2022, under certain circumstances, CommScope, Inc. may also redeem up to 40% of the aggregate principal amount of the New Unsecured Notes at a redemption price of 108.25%, plus accrued and unpaid interest, using the proceeds of certain equity offerings.

In connection with issuing the New Unsecured Notes, the Company incurred costs of $17.3 million during the year ended December 31, 2019, which were recorded as a reduction of the carrying amount of the debt and are being amortized over the term of the New Unsecured Notes.

During 2019, $500.0 million aggregate principal amount of the 2021 Notes was redeemed and resulted in the write-off of $2.1 million of debt issuance costs, which was reflected in interest expense.

5.00% Senior Notes due 2027 and 6.00% Senior Notes due 2025 (the CommScope Technologies Notes)

The 2027 Notes mature on March 15, 2027 and the 2025 Notes mature on June 15, 2025. Interest is payable on the 2027 Notes semi-annually in arrears on March 15 and September 15 of each year and on the 2025 Notes on June 15 and December 15 of each year.

The CommScope Technologies Notes are guaranteed on a senior unsecured basis by CommScope, Inc. and each of CommScope, Inc.'s existing and future wholly owned domestic restricted subsidiaries (other than CommScope Technologies) that is an obligor under the senior secured credit facilities or certain other capital markets debt, subject to certain exceptions. The CommScope Technologies Notes and the related guarantees rank senior in right of payment to all of CommScope Technologies' and the guarantors' subordinated indebtedness and equally in right of payment with all of CommScope Technologies' and the guarantors' senior indebtedness (without giving effect to collateral arrangements), including the senior secured credit facilities and the other Senior Notes. The CommScope Technologies Notes and the related guarantees are effectively junior to all of CommScope Technologies' and the guarantors' existing and future secured indebtedness, including the Secured Notes and the senior secured credit facilities, to the extent of the value of the assets securing such secured indebtedness. In addition, the CommScope Technologies Notes and related guarantees are structurally subordinated to all existing and future liabilities (including trade payables) of CommScope, Inc.'s subsidiaries that do not guarantee the CommScope Technologies Notes.

The CommScope Technologies Notes may be redeemed prior to maturity under certain circumstances. Upon certain change of control events, the CommScope Technologies Notes may be redeemed at the option of the holders at 101% of their principal amount, plus accrued and unpaid interest. The 2027 Notes may be redeemed by CommScope Technologies on or after March 15, 2022 at the redemption prices specified in the indenture governing the 2027 Notes. Prior to March 15, 2022, the 2027 Notes may be redeemed by CommScope Technologies at a redemption price equal to 100% of the aggregate principal amount of the 2027 Notes to be redeemed, plus a make-whole premium (as specified in the indenture governing the 2027 Notes), plus accrued and unpaid interest. Prior to March 15, 2020, under certain circumstances, CommScope Technologies may also redeem up to 40% of the aggregate principal amount of the 2027 Notes at a redemption price of 105%, plus accrued and unpaid interest, using the proceeds of certain equity offerings. The 2025 Notes may be redeemed by CommScope Technologies on or after June 15, 2020 at the redemption prices specified in the indenture governing the 2025 Notes. Prior to June 15, 2020, the 2025 Notes may be redeemed by CommScope Technologies at a redemption price equal to 100% of the aggregate principal amount to be redeemed, plus a make-whole premium (as specified in the indenture governing the 2025 Notes), plus accrued and unpaid interest. Prior to June 15, 2020, under certain circumstances, CommScope Technologies may also redeem up to 40% of the aggregate principal amount of the 2027 Notes at a redemption price of 106%, plus accrued and unpaid interest, using the proceeds of certain equity offerings.

In connection with issuing the 2027 Notes, the Company paid $7.2 million of debt issuance costs during the year ended December 31, 2017, which was recorded as a reduction of the carrying amount of the debt and is being amortized over the term of the notes.

Senior Secured Credit Facilities

Senior Secured Term Loan Due 2026

In connection with the Acquisition, on April 4, 2019, CommScope, Inc. borrowed $3.2 billion, less $32.0 million of original issue discount, under a new senior secured term loan due 2026 (the 2026 Term Loan). The Company used a portion of the proceeds from the 2026 Term Loan to pay off the remaining $261.3 million on the 2022 Term Loan and the rest of the proceeds were used to finance the Acquisition. During the first quarter of 2019, the Company repaid $225.0 million of the 2022 Term Loan. In connection with the repayments of the 2022 Term Loan, $4.1 million and $7.7 million of original issue discount and debt issuance costs were written off and included in interest expense for the year ended December 31, 2019. The Company incurred costs of $50.0 million during the year ended December 31, 2019 related to the 2026 Term Loan that were recorded as a reduction of the carrying amount of the debt after closing of the Acquisition and will be amortized over the term of the 2026 Term Loan. The Company also incurred ticking fees related to the 2026 Term Loan of $12.3 million during the year ended December 31, 2019 that were included in interest expense.

The 2026 Term Loan has scheduled amortization payments of $32.0 million per year due in equal quarterly installments, beginning with the quarter ending December 31, 2019, with the balance due at maturity (April 2026). The current portion of long-term debt reflects $32.0 million of repayments due under the 2026 Term Loan. The interest rate is, at the Company's option, either (1) the base rate (which is the highest of (w) the greater of the then-current federal funds rate set by the Federal Reserve Bank of New York and the overnight federal funds rate, in each case, plus 0.5%, (x) the prime rate on such day, (y) the one-month Eurodollar rate published on such date plus 1.00% and (z) 1.00% per annum) plus an applicable margin of 2.25% or (2) one-, two-, three- or six-month LIBOR or, if available from all lenders, 12-month LIBOR or any shorter period (selected at the option of CommScope, Inc.) plus an applicable margin of 3.25%. The 2026 Term Loan is subject to a LIBOR floor of 0.00%.

Subject to certain conditions, the 2026 Term Loan may be increased or a new incremental term loan facility may be added to increase the capacity by up to the sum of the greater of $950.0 million and 50% of Consolidated EBITDA, as defined in the credit agreement governing the 2026 Term Loan (the Credit Agreement), plus an unlimited amount as long as on a pro forma basis the Company meets certain net leverage ratios or fixed charge ratios as defined in the Credit Agreement.

CommScope, Inc. may voluntarily prepay loans under the 2026 Term Loan, subject to minimum amounts, with prior notice but without premium or penalty. CommScope, Inc. must prepay the 2026 Term Loan with the net cash proceeds of certain asset sales, the incurrence or issuance of specified refinancing indebtedness and, commencing with the fiscal year ending in December 2020, 50% of excess cash flow (such percentage subject to reduction based on the achievement of specified Consolidated First Lien Net Leverage Ratios), in each case, subject to certain reinvestment rights and other exceptions.

CommScope, Inc.'s obligations under the 2026 Term Loan are guaranteed by the Company and each of CommScope, Inc.'s direct and indirect wholly owned U.S. subsidiaries (subject to certain permitted exceptions based on immateriality thresholds of aggregate assets and revenues of excluded U.S. subsidiaries). The 2026 Term Loan is secured by a lien on substantially all of CommScope, Inc.'s and the guarantors' current and fixed assets (subject to certain exceptions), and the 2026 Term Loan will have a first-priority lien on all fixed assets and a second-priority lien on all current assets (second in priority to the liens securing the new asset-based revolving credit facility), in each case, subject to other permitted liens.

The 2026 Term Loan contains customary negative covenants consistent with those applicable to the New Notes, including, but not limited to, restrictions on the ability of CommScope, Inc. and its subsidiaries to merge and consolidate with other companies, incur indebtedness, grant liens or security interests on assets, pay dividends (except with respect to the Convertible Preferred Stock) or make other restricted payments, sell or otherwise transfer assets or enter into certain transactions with affiliates.

The 2026 Term Loan provides that, upon the occurrence of certain events of default, the obligations thereunder may be accelerated. Such events of default will include payment defaults, material inaccuracies of representations and warranties, covenant defaults, cross-defaults to other material indebtedness, voluntary and involuntary bankruptcy proceedings, material money judgments, material pension-plan events, change of control and other customary events of default.

Senior Secured Revolving Credit Facility

On April 4, 2019, the Company replaced its asset-based revolving credit facility with a new asset-based revolving credit facility in an amount of up to $1.0 billion, subject to borrowing capacity, with a maturity in April 2024, available to CommScope, Inc. and its U.S. subsidiaries designated as co-borrowers (the Revolving Borrowers). The ability to draw under the new asset-based revolving credit facility or issue letters of credit is conditioned upon, among other things, delivery of prior written notice of a borrowing or issuance, as applicable, the ability of the borrowers to reaffirm the representations and warranties contained in the new asset-based revolving credit facility and the absence of any default or event of default. In connection with the new asset-based revolving credit facility, the Company incurred costs of approximately $13.2 million in the year ended December 31, 2019, which were recorded in other noncurrent assets and are being amortized over the term of the credit facility. The Company borrowed and repaid $15.0 million under the new asset-based revolving credit facility during the year ended December 31, 2019. As of December 31, 2019, the Company had no outstanding borrowings under the new asset-based revolving credit facility and had availability of $796.8 million, after giving effect to borrowing base limitations and outstanding letters of credit.

Letters of credit under the new asset-based revolving credit facility are limited to the lesser of (x) $250.0 million and (y) the aggregate unused amount of commitments under the new asset-based revolving credit facility then in effect. Subject to certain conditions, the new asset-based revolving credit facility may be expanded by up to $400.0 million in additional commitments. Loans under the new asset-based revolving credit facility may be denominated, at the option of the Revolving Borrowers, in U.S. dollars, euros, pounds sterling or Swiss francs.

Borrowings under the new asset-based revolving credit facility are limited by borrowing base calculations based on the sum of specified percentages of eligible accounts receivable and eligible inventory, minus the amount of any applicable reserves. Borrowings will bear interest at a floating rate, which can be either an adjusted Eurodollar rate plus an applicable margin of 1.25% to 1.50% or, at the option of the Revolving Borrowers, a base rate plus an applicable margin of 0.25% to 0.50%.

(In millions, unless otherwise noted)

The obligations of the Revolving Borrowers under the new asset-based revolving credit facility are guaranteed by the Company, CommScope, Inc. and each of CommScope, Inc.'s direct and indirect wholly owned U.S. subsidiaries (subject to certain permitted exceptions based on immateriality thresholds of aggregate assets and revenues of excluded U.S. subsidiaries). The new asset-based revolving credit facility is secured by a lien on substantially all of the Revolving Borrowers' and the guarantors' current and fixed assets (subject to certain exceptions). The new asset-based revolving credit facility has a first-priority lien on all current assets and a second-priority lien on all fixed assets (second in priority to the liens securing the 2024 Secured Notes, the 2026 Secured Notes and the 2026 Term Loan), in each case, subject to other permitted liens.

The following fees are applicable under the new asset-based revolving credit facility: (i) an unused line fee of (x) 0.25% per annum of the unused portion of the new asset-based revolving credit facility when the average unused portion of the facility is less than 50% of the aggregate commitments under the new asset-based revolving credit facility or (y) 0.375% per annum of the unused portion of the new asset-based revolving credit facility when the average unused portion of the facility is equal to or greater than 50% of the aggregate commitments under the new asset-based revolving credit facility; (ii) a letter of credit participation fee on the aggregate stated amount of each letter of credit equal to the applicable margin for adjusted Eurodollar rate loans, as applicable; (iii) a letter of credit fronting fee of 0.125% per annum, multiplied by the average aggregate daily maximum amount available to be drawn under all applicable letters of credit issued by such letter of credit issuer; and (iv) certain other customary fees and expenses of the lenders and agents thereunder.

The Revolving Borrowers will be required to make prepayments under the new asset-based revolving credit facility at any time when, and to the extent that, the aggregate amount of the outstanding loans and letters of credit under the new asset-based revolving credit facility exceeds the lesser of the aggregate amount of commitments in respect of the new asset-based revolving credit facility and the borrowing base.

The new asset-based revolving credit facility contains customary covenants, including, but not limited to, restrictions on the ability of CommScope, Inc. and its subsidiaries to merge and consolidate with other companies, incur indebtedness, grant liens or security interests on assets, make acquisitions, loans, advances or investments, pay dividends (except with respect to the Convertible Preferred Stock), sell or otherwise transfer assets, optionally prepay or modify terms of any junior indebtedness, enter into certain transactions with affiliates or change lines of business. The new asset-based revolving credit facility contains a Covenant Fixed Charge Coverage Ratio (as defined in the credit agreement governing the asset-based revolving credit facility) of 1.00 to 1.00. The credit agreement provides that, in the event excess availability under the asset-based revolving credit facility is less than the greater of $80 million and 10% of the borrowing base as of the end of any fiscal quarter, the Covenant Fixed Charge Coverage Ratio for that fiscal quarter must be tested and must exceed the level set forth above. As of December 31, 2019, the Company's excess availability and Covenant Fixed Charge Coverage Ratio were in excess of the asset-based revolving credit facility's requirements.

The new asset-based revolving credit facility provides that, upon the occurrence of certain events of default, the obligations thereunder may be accelerated and the lending commitments terminated. Such events of default include payment defaults, material inaccuracies of representations and warranties, covenant defaults, cross-defaults to other material indebtedness, voluntary and involuntary bankruptcy proceedings, material money judgments, material pension-plan events, certain change of control events and other customary events of default.

Other Matters

The following table summarizes scheduled maturities of long-term debt as of December 31, 2019:

	2020	2021	2022	2023	2024	Thereafter
Scheduled maturities of long-term debt	$ 32.0	$ 182.0	$ 32.0	$ 32.0	$ 1,932.0	$ 7,782.0

(In millions, unless otherwise noted)

The Company's non-guarantor subsidiaries held $3,773 million, or 26%, of total assets and $714 million, or 6%, of total liabilities as of December 31, 2019 and accounted for $3,044 million, or 37%, of net sales for the year ended December 31, 2019. As of December 31, 2018, the non-guarantor subsidiaries held $2,354 million, or 36%, of total assets and $454 million, or 9%, of total liabilities. For the year ended December 31, 2018, the non-guarantor subsidiaries accounted for $1,835 million, or 40%, of net sales. All amounts presented exclude intercompany balances.

The Company is dependent upon the earnings and cash flow of its subsidiaries to make certain payments, including debt and interest payments. Certain subsidiaries may have limitations or restrictions on transferring funds to other subsidiaries that may be necessary to meet those requirements.

The weighted average effective interest rate on outstanding borrowings, including the amortization of debt issuance costs and original issue discount, was 6.13% at December 31, 2019 and 5.73% at December 31, 2018.

9. DERIVATIVES AND HEDGING ACTIVITIES

Derivatives Not Designated As Hedging Instruments

The Company uses forward contracts to hedge a portion of its balance sheet foreign exchange re-measurement risk and to hedge certain planned foreign currency expenditures. As of December 31, 2019, the Company had foreign exchange contracts outstanding with maturities of up to ten months and aggregate notional values of $508.0 million (based on exchange rates as of December 31, 2019). Unrealized gains and losses resulting from these contracts are recognized in other expense, net and partially offset corresponding foreign exchange gains and losses on the balances and expenditures being hedged.

The following table presents the balance sheet location and fair value of the Company's derivatives not designated as hedging instruments:

		Fair Value of Asset (Liability) December 31,	
	Balance Sheet Location	**2019**	**2018**
Foreign currency contracts	Prepaid expenses and other current assets	$ 4.9	$ 1.7
Foreign currency contracts	Accrued and other liabilities	(5.9)	(3.0)
Total derivatives not designated as hedging instruments		$ (1.0)	$ (1.3)

The pretax impact of the foreign currency forward contracts, both matured and outstanding, on the Consolidated Statements of Operations is as follows:

Foreign Currency Forward Contracts	**Location of Gain (Loss)**	**Gain (Loss) Recognized**
Year ended December 31, 2019	Other expense, net	$ (13.6)
Year ended December 31, 2018	Other expense, net	$ (17.8)
Year ended December 31, 2017	Other expense, net	$ 28.6

Derivative Instruments Designated As Net Investment Hedges

The Company has a hedging strategy to designate certain foreign currency contracts as net investment hedges to mitigate a portion of the foreign currency risk on the euro net investment in a foreign subsidiary. As of December 31, 2019, the Company held designated foreign currency contracts with outstanding maturities of up to eighteen months and an aggregate notional value of $300 million. For the year ended December 31, 2019, the Company recognized $4.4 million of pre-tax income in interest expense as a result of amounts excluded from hedge effectiveness under the spot method. As of December 31, 2019 and 2018, there was no ineffectiveness on the instruments designated as net investment hedges.

(In millions, unless otherwise noted)

The following table presents the balance sheet location and fair value of the derivative instruments designated as net investment hedges:

	Balance Sheet Location	Fair Value of Asset (Liability) December 31, 2019	2018
Foreign currency contracts	Prepaid expenses and other current assets	$ —	$ 0.8
Foreign currency contracts	Other noncurrent assets	5.8	—
Total derivatives designated as hedging instruments		$ 5.8	$ 0.8

The after tax impact of the forward contracts designated as net investment hedging instruments, both matured and outstanding, on the Statements of Operations is as follows:

Foreign Currency Forward Contracts	Location of Gain (Loss)	Effective Portion of Gain (Loss) Recognized
Year ended December 31, 2019	Other comprehensive income (loss), net of tax	$ 5.6
Year ended December 31, 2018	Other comprehensive income (loss), net of tax	$ 3.5
Year ended December 31, 2017	Other comprehensive income (loss), net of tax	$ (5.0)

Derivative Instruments Designated As Cash Flow Hedges of Interest Rate Risk

As part of the Company’s hedging strategy to mitigate a portion of the exposure to changes in cash flows resulting from variable interest rates on the 2026 Term Loan which are based on the one-month LIBOR benchmark rate (see Note 8), during the first quarter of 2019, the Company entered into and designated pay-fixed, receive-variable interest rate swap derivatives as cash flow hedges of interest rate risk which effectively fixed the interest rate on a portion the variable-rate debt. Total notional amount of the interest rate swap derivatives as of December 31, 2019 was $600 million with outstanding maturities up to fifty-one months. There were no derivative instruments designated as cash flow hedges of interest rate risk during the years ended December 31, 2018 or 2017. As of December 31, 2019, there was no ineffectiveness on the instruments designated as cash flow hedges.

The following table presents the balance sheet location and fair value of the derivative instruments designated as cash flow hedges of interest rate risk:

	Balance Sheet Location	Fair Value of Asset (Liability) December 31, 2019	December 31, 2018
Interest rate swap contracts	Other noncurrent liabilities	$ (16.3)	$ —
Total derivatives designated as cash flow hedges of interest rate risk		$ (16.3)	$ —

The impact of the effective portion of the interest rate swap contracts designated as cash flow hedging instruments on the Consolidated Statements of Comprehensive Income (Loss) is as follows:

Interest Rate Derivatives	Location of Loss	Effective Portion of Loss Recognized
Year Ended December 31, 2019	Other comprehensive income (loss), net of tax	$ (12.2)

(In millions, unless otherwise noted)

10. FAIR VALUE MEASUREMENTS

The Company's financial instruments consist primarily of cash and cash equivalents, trade receivables, trade payables, debt instruments, interest rate derivatives and foreign currency contracts. For cash and cash equivalents, trade receivables and trade payables, the carrying amounts of these financial instruments as of December 31, 2019 and December 31, 2018 were considered representative of their fair values due to their short terms to maturity. The fair values of the Company's debt instruments, interest rate derivatives and foreign currency contracts were based on indicative quotes.

Fair value measurements using quoted prices in active markets for identical assets and liabilities fall within Level 1 of the fair value hierarchy, measurements using significant other observable inputs fall within Level 2, and measurements using significant unobservable inputs fall within Level 3.

The carrying amounts, estimated fair values and valuation input levels of the Company's debt instruments, interest rate derivatives and foreign currency contracts as of December 31, 2019 and December 31, 2018, are as follows:

	December 31, 2019		December 31, 2018		
	Carrying Amount	Fair Value	Carrying Amount	Fair Value	Valuation Inputs
Assets:					
Foreign currency contracts	$ 10.7	$ 10.7	$ 2.5	$ 2.5	Level 2
Liabilities:					
5.00% senior notes due 2027	750.0	696.4	750.0	608.0	Level 2
8.25% senior notes due 2027	1,000.0	1,052.5	—	—	Level 2
6.00% senior notes due 2025	1,500.0	1,501.7	1,500.0	1,355.6	Level 2
5.50% senior notes due 2024	650.0	656.0	650.0	591.8	Level 2
5.00% senior notes due 2021	150.0	149.9	650.0	641.9	Level 2
6.00% senior secured notes due 2026	1,500.0	1,595.6	—	—	Level 2
5.50% senior secured notes due 2024	1,250.0	1,302.1	—	—	Level 2
Senior secured term loan due 2026	3,192.0	3,219.9	—	—	Level 2
Senior secured term loan due 2022	—	—	486.3	461.9	Level 2
Foreign currency contracts	5.9	5.9	3.0	3.0	Level 2
Interest rate swap contracts	16.3	16.3	—	—	Level 2

Non-Recurring Fair Value Measurements

During the fourth quarter of 2019, the Company recorded a pretax goodwill impairment charge of $376.1 million related to the CPE, N&C and Ruckus segments (see Note 4). The fair value of each reporting unit was determined using a discounted cash flow (DCF) model and a guideline public company approach, with 75% of the value determined using the DCF model and 25% of the value determined using the market approach. Under the DCF method, the fair value of a reporting unit is based on the present value of estimated future cash flows. Under the guideline public company method, the fair value is based upon market multiples of revenue and earnings derived from publicly traded companies with similar operating and investment characteristics as the reporting unit. The inputs to both the DCF model and the guideline public company analysis are Level 3 valuation inputs. Changes in any of these inputs, among other factors, could negatively affect the fair value of one or more of the Company's reporting units and result in a material impairment charge in the future.

During the fourth quarter of 2018, the Company recorded a pretax charge of $15.0 million that was allocated equally to the Connectivity and Mobility segments to fully impair an equity investment in a privately-held company. The determination of the impairment charge was based on Level 3 valuation inputs.

These fair value estimates are based on pertinent information available to management as of the valuation date. Although management is not aware of any factors that would significantly affect these fair value estimates, such amounts have not been comprehensively revalued for purposes of these financial statements since those dates, and current estimates of fair value may differ significantly from the amounts presented.

(In millions, unless otherwise noted)

11. RESTRUCTURING COSTS

The Company incurs costs associated with restructuring initiatives intended to improve overall operating performance and profitability. The costs related to restructuring actions are generally composed of employee-related costs, fixed asset related costs and lease related costs. Employee-related costs include the expected severance costs and related benefits as well as one-time severance benefits that are accrued over the remaining period employees are required to work in order to receive such benefits. Fixed asset related costs include non-cash impairments or fixed asset disposals associated with restructuring actions in addition to the cash costs to uninstall, pack, ship and reinstall manufacturing equipment and the costs to prepare the receiving facility to accommodate relocated equipment. Fixed asset related costs are expensed as incurred. Cash paid is net of proceeds received from the sale of related assets. Effective January 1, 2019, with the adoption of ASU No. 2016-02, *Leases*, lease exit obligations related to unused leased facilities are reported as part of lease liabilities. Contract termination related costs include non-cash impairments of lease assets related to restructuring actions in addition to any one-time cash termination costs.

As a result of restructuring and consolidation actions, the Company owns unutilized real estate at various facilities in the U.S. and internationally. The Company is attempting to sell or lease this unutilized space. Additional impairment charges may be incurred related to these or other excess assets.

The Company's net pretax restructuring charges, by segment, were as follows:

	Year Ended December 31,		
	2019	2018	2017
Connectivity	$ 12.4	$ 24.2	$ 36.6
Mobility	11.2	19.8	7.2
CPE	23.2	—	—
N&C	32.1	—	—
Ruckus	8.8	—	—
Total	$ 87.7	$ 44.0	$ 43.8

Restructuring reserves were included in the Company's Consolidated Balance Sheets as follows:

	December 31,	
	2019	2018
Accrued and other liabilities	$ 24.0	$ 29.9
Other noncurrent liabilities	4.4	5.1
Total liability	$ 28.4	$ 35.0

ARRIS Integration Restructuring Actions

In anticipation of and following the ARRIS Acquisition, the Company initiated a series of restructuring actions, which are currently ongoing, to integrate and streamline operations and achieve cost synergies. The activity within the liability established for the ARRIS integration restructuring actions was as follows:

	Employee-Related Costs	Contractual Termination Costs	Total
Balance at December 31, 2018	$ —	$ —	$ —
Obligation assumed in ARRIS acquisition	2.3	—	2.3
Additional charge recorded	81.8	4.3	86.1
Cash paid	(60.9)	(1.0)	(61.9)
Foreign exchange and other non-cash items	(0.1)	(1.3)	(1.4)
Balance at December 31, 2019	$ 23.1	$ 2.0	$ 25.1

(In millions, unless otherwise noted)

The ARRIS integration actions include headcount reductions in sales, engineering, marketing and administrative functions. The Company expects to make cash payments of $21.4 million during 2020 and additional cash payments of $3.7 million between 2021 and 2022 to settle the announced ARRIS integration initiatives. Additional restructuring actions related to the ARRIS integration are expected to be identified and the resulting charges and cash requirements are expected to be material.

Broadband Network Systems (BNS) Integration Restructuring Actions

Following the acquisition of BNS, the Company initiated a series of restructuring actions, which are currently ongoing, to integrate and streamline operations and achieve cost synergies. The activity within the liability established for the BNS integration restructuring actions was as follows:

	Employee-Related Costs	Contractual Termination Costs	Fixed Asset Related Costs	Total
Balance at December 31, 2016	$ 32.7	$ 0.4	$ —	$ 33.1
Additional charge recorded	33.6	1.3	8.2	43.1
Cash paid	(41.1)	(0.6)	(0.6)	(42.3)
Consideration received	—	—	2.7	2.7
Foreign exchange and other non-cash items	0.4	—	(10.3)	(9.9)
Balance at December 31, 2017	25.6	1.1	—	26.7
Additional charge recorded	41.0	1.5	(0.8)	41.7
Cash paid	(37.1)	(2.3)	(0.8)	(40.2)
Consideration received	—	—	11.1	11.1
Foreign exchange and other non-cash items	(0.3)	—	(9.5)	(9.8)
Balance at December 31, 2018	29.2	0.3	—	29.5
Additional charge recorded	1.4	0.3	(0.2)	1.5
Cash paid	(27.1)	(0.6)	(0.2)	(27.9)
Foreign exchange and other non-cash items	(0.2)	—	0.4	0.2
Balance at December 31, 2019	$ 3.3	$ —	$ —	$ 3.3

The BNS integration actions include the announced closures or reduction in activities at various U.S. and international facilities as well as headcount reductions in sales, marketing and administrative functions. The Company has recognized restructuring charges of $153.0 million since the BNS acquisition for integration actions. No additional restructuring actions are expected in connection with the BNS integration initiatives. The Company expects to make cash payments of $2.5 million during 2020 and additional cash payments of $0.8 million between 2021 and 2022.

12. EMPLOYEE BENEFIT PLANS

Defined Contribution Plans

The Company and certain of its subsidiaries have defined contribution retirement savings plans, the most significant of which is a 401(k) plan in the U.S. With the acquisition of ARRIS, the Company assumed sponsorship of their U.S. 401(k) plan and various other domestic and international defined contribution retirement savings plans. These plans allow employees meeting certain requirements to contribute a portion of their compensation on a pretax and/or after-tax basis in accordance with guidelines established by the plans and the Internal Revenue Service or other tax authorities. The Company matches a percentage of the employee contributions up to certain limits. During the years ended December 31, 2019, 2018 and 2017, the Company made contributions to defined contribution retirement savings plans of $41.8 million, $24.0 million and $25.9 million, respectively.

The Company maintains noncontributory and contributory deferred compensation plans including some assumed with the acquisition of ARRIS. During the years ended December 31, 2019, 2018 and 2017, the Company recognized pretax costs of $3.5 million, $0.7 million and $2.9 million, respectively, related to these plans. The liability related to these plans was $43.8 million and $32.6 million as of December 31, 2019 and 2018, respectively.

(In millions, unless otherwise noted)

Pension Plans

The Company sponsors defined benefit pension plans covering certain former domestic employees and certain current and former foreign employees. With the acquisition of ARRIS, the Company assumed sponsorship of various other domestic and international defined benefit pension plans covering current and former employees. Included in the defined benefit pension plans are both funded and unfunded plans. The following table summarizes information for the defined benefit pension plans:

	December 31,			
	U.S. Plans		Non-U.S. Plans	
	2019	2018	2019	2018
Change in benefit obligation:				
Benefit obligation, beginning	$ 2.2	$ 156.7	$ 208.8	$ 240.7
Obligation assumed in ARRIS acquisition	10.0	—	12.6	—
Service cost	—	—	4.0	4.1
Interest cost	0.3	4.2	5.2	5.2
Actuarial loss (gain)	0.9	(4.6)	27.5	(18.0)
Benefits paid	(0.6)	(10.7)	(4.6)	(9.4)
Settlements	—	(143.4)	(6.4)	(0.8)
Foreign exchange and other	—	—	4.4	(13.0)
Benefit obligation, ending	$ 12.8	$ 2.2	$ 251.5	$ 208.8
Change in plan assets:				
Fair value of plan assets, beginning	$ —	$ 161.0	$ 203.4	$ 226.5
Assets assumed in ARRIS acquisition	—	—	4.2	—
Employer and plan participant contributions	0.6	1.7	4.9	5.6
Return on plan assets	—	(8.6)	25.0	(6.7)
Benefits paid	(0.6)	(10.7)	(4.6)	(9.4)
Settlements	—	(143.4)	(6.4)	(0.8)
Foreign exchange and other	—	—	4.3	(11.8)
Fair value of plan assets, ending	$ —	$ —	$ 230.8	$ 203.4
Funded status, net liability or (net asset)	$ 12.8	$ 2.2	$ 20.7	$ 5.4

The following table presents the balance sheet location of the Company's pension liabilities and assets:

	December 31,			
	U.S. Plans		Non-U.S. Plans	
	2019	2018	2019	2018
Accrued and other liabilities	$ (0.8)	$ (0.2)	$ (0.5)	$ (0.3)
Other noncurrent liabilities	(12.0)	(2.0)	(23.2)	(11.3)
Other noncurrent assets	—	—	3.0	6.2

The Company terminated a significant U.S. defined benefit pension plan in the fourth quarter of 2018 through the purchase of annuities. Upon termination, the Company recognized a pretax charge in other expense, net, of $34.5 million in 2018 primarily related to unrecognized net actuarial losses previously recorded in accumulated other comprehensive loss.

The accumulated benefit obligation for the Company’s U.S. defined benefit pension plans was $12.8 million and $2.2 million as of December 31, 2019 and 2018, respectively, and the accumulated benefit obligation for the Company’s non-U.S. defined benefit pension plans was $211.8 million and $174.6 million as of December 31, 2019 and 2018, respectively.

(In millions, unless otherwise noted)

The following table summarizes information for the Company's pension plans with an accumulated benefit obligation in excess of plan assets:

	December 31,			
	U.S. Plans		Non-U.S. Plans	
	2019	2018	2019	2018
Projected benefit obligation	$ 12.8	$ 2.2	$ 30.9	$ 13.1
Accumulated benefit obligation	12.8	2.2	26.1	11.5
Fair value of plan assets	—	—	8.5	3.8

The following table summarizes pretax amounts included in accumulated other comprehensive loss:

	December 31,			
	U.S. Plans		Non-U.S. Plans	
	2019	2018	2019	2018
Unrecognized net actuarial loss	$ (1.3)	$ (0.4)	$ (31.5)	$ (22.8)
Unrecognized prior service cost	—	—	(0.7)	(0.7)
Total	$ (1.3)	$ (0.4)	$ (32.2)	$ (23.5)

Actuarial gains and losses are amortized using a corridor approach. The corridor is equal to 10% of the greater of the benefit obligation and the fair value of the assets. Gains and losses in excess of the corridor are generally amortized over the average remaining life of the plan participants. Pretax amounts for net periodic benefit cost and other amounts included in other comprehensive income (loss) for the defined benefit pension plans consisted of the following components:

	Year Ended December 31,					
	U.S. Plans			Non-U.S. Plans		
	2019	2018	2017	2019	2018	2017
Service cost	$ —	$ —	$ —	$ 4.0	$ 4.1	$ 4.9
Interest cost	0.3	4.2	5.9	5.2	5.2	5.3
Recognized actuarial loss	—	0.4	0.7	0.7	1.3	1.5
Expected return on plan assets	—	(5.1)	(6.8)	(6.8)	(7.7)	(7.6)
Settlement loss	—	34.5	—	0.9	—	—
Net periodic benefit cost (income)	0.3	34.0	(0.2)	4.0	2.9	4.1
Changes in plan assets and benefit obligations included in other comprehensive income (loss):						
Change in unrecognized net actuarial loss (gain)	0.9	8.7	(4.7)	8.7	(5.6)	(4.0)
Change in unrecognized prior service cost	—	—	—	—	0.3	0.4
Settlement	—	(34.5)	—	—	—	—
Total included in other comprehensive income (loss)	0.9	(25.8)	(4.7)	8.7	(5.3)	(3.6)
Total recognized in net periodic benefit cost and included in other comprehensive income (loss)	$ 1.2	$ 8.2	$ (4.9)	$ 12.7	$ (2.4)	$ 0.5

The Company reports the service cost component of net periodic benefit cost in the same line item as other compensation costs arising from the services rendered by the employee and records the other components of net periodic benefit cost in other expense, net.

(In millions, unless otherwise noted)

Assumptions

Significant weighted average assumptions used in determining benefit obligations and net periodic benefit cost are as follows:

	U.S. Plans			Non-U.S. Plans		
	2019	2018	2017	2019	2018	2017
Benefit obligations:						
Discount rate	2.95 %	3.70 %	3.50 %	1.65 %	2.50 %	2.23 %
Rate of compensation increase	— %	— %	— %	3.74 %	3.92 %	3.92 %
Net periodic benefit cost:						
Discount rate	3.70 %	3.50 %	3.94 %	2.50 %	2.23 %	2.38 %
Rate of return on plan assets	— %	— %	4.10 %	3.03 %	3.41 %	3.49 %
Rate of compensation increase	— %	— %	— %	3.92 %	3.92 %	4.04 %

The Company considered the available yields on high-quality fixed-income investments with maturities corresponding to the Company's expected benefit obligations to determine the discount rates at each measurement date.

Plan Assets

In developing the expected rate of return on plan assets, the Company considered the expected long-term rate of return on individual asset classes. Expected return on plan assets is based on the market value of the assets. A portion of the non-U.S. pension assets are managed by independent investment advisors with an objective of transitioning to a portfolio of fixed income and absolute return investments that matches the durations of the obligations as the funded status of each plan improves. The absolute return investment fund is a diversified portfolio designed to achieve long-term total returns. The remainder of the non-U.S. pension assets is invested with the objective of maximizing return.

Mutual funds classified as Level 1 are valued at net asset value, which is based on the fair value of the funds' underlying securities. Certain mutual funds are classified as Level 2 because a portion of the funds' underlying assets are valued using significant other observable inputs. Other assets are primarily composed of fixed income investments (including insurance and real estate products) and are valued based on the investment's stated rate of return, which approximates market interest rates.

The Company had no U.S. defined benefit pension plan assets as of December 31, 2019 or 2018. The estimated fair values and the valuation input levels of the Company's non-U.S. defined benefit pension plan assets are as follows:

	December 31, 2019	
	Non-U.S. Plans	
	Level 1 Fair Value	Level 2 Fair Value
Mutual funds:		
International equity	$ 27.7	$ 16.4
International debt	37.7	97.5
Absolute return	—	33.8
Other	8.3	9.4
Total	$ 73.7	$ 157.1

	December 31, 2018	
	Non-U.S. Plans	
	Level 1 Fair Value	Level 2 Fair Value
Mutual funds:		
International equity	$ 22.6	$ 25.5
International debt	36.1	82.4
Absolute return	—	26.2
Other	2.9	7.7
Total	$ 61.6	$ 141.8

Expected Cash Flows

The Company expects to contribute $0.8 million to U.S defined benefit pension plans and $5.1 million to non-U.S. defined benefit pension plans during 2020.

The following table summarizes projected benefit payments from pension plans through 2029, including benefits attributable to estimated future service (in millions):

	U.S. Plans	Non-U.S. Plans
2020	$ 0.8	$ 7.4
2021	0.8	6.1
2022	0.8	6.8
2023	0.9	6.3
2024	0.9	9.0
2025-2029	4.6	52.7

Other Postretirement Benefit Plans

The Company sponsors postretirement health care and life insurance benefit plans that provide benefits to certain former U.S. employees and certain U.S. full-time employees who retire from the Company. The health care plans contain various cost-sharing features such as participant contributions, deductibles, coinsurance and caps, with Medicare as the primary provider of health care benefits for eligible retirees. The Company amended certain of the plans to terminate benefits as of December 31, 2018 and recognized a pre-tax gain of $9.7 million in other expense, net in 2018, primarily related to the reclassification of unrecognized prior service credits and unrecognized net actuarial gains from accumulated other comprehensive loss. The accounting for the remainder of the health care plans anticipates future cost-sharing changes that are consistent with the Company’s expressed intent to maintain a consistent level of cost sharing or capped benefits with retirees. There are no plan assets associated with these post-retirement health care and life insurance benefit plans.

The benefit obligation for the remaining plans was $3.9 million and $4.2 million as of December 31, 2019 and 2018, respectively, primarily recorded in other noncurrent liabilities on the Consolidated Balance Sheets. The pretax gains recognized in accumulated other comprehensive loss were $2.3 million and $3.1 million for the years ended December 31, 2019 and 2018, respectively, mostly related to unrecognized actuarial gains. The net periodic benefit income of $1.0 million, $7.4 million (excluding the gain discussed above related to the termination of certain benefits) and $4.7 million for the years ended December 31, 2019, 2018 and 2017, respectively, resulted primarily from the amortization of net actuarial gains and prior service credits.

(In millions, unless otherwise noted)

13. INCOME TAXES

Income (loss) before income taxes includes the results from domestic and international operations as follows:

	Year Ended December 31,		
	2019	2018	2017
U.S. companies	$ (1,112.7)	$ 64.0	$ 89.2
Non-U.S. companies	38.7	106.7	120.6
Income (loss) before income taxes	$ (1,074.0)	$ 170.7	$ 209.8

The components of income tax expense (benefit) were as follows:

	Year Ended December 31,		
	2019	2018	2017
Current:			
Federal	$ 33.3	$ 9.6	$ 17.0
Foreign	72.3	64.7	64.8
State	10.7	5.4	5.7
Current income tax expense	$ 116.3	79.7	87.5
Deferred:			
Federal	$ (198.2)	(26.1)	(58.0)
Foreign	(30.8)	(20.5)	(11.7)
State	(31.8)	(2.6)	(1.8)
Deferred income tax benefit	(260.8)	(49.2)	(71.5)
Total income tax expense (benefit)	$ (144.5)	$ 30.5	$ 16.0

The reconciliation of income taxes calculated at the statutory U.S. federal income tax rate to the Company’s provision for income taxes was as follows:

	Year Ended December 31,		
	2019	2018	2017
Provision for income taxes at federal statutory rate	$ (225.6)	$ 35.8	$ 73.4
State income taxes, net of federal tax effect	(26.2)	7.6	7.1
Other permanent items	6.2	8.0	4.5
Equity-based compensation	3.4	(4.6)	(13.4)
U.S. tax reform	1.6	(7.8)	(22.3)
Other changes in tax laws or rates	2.2	(0.2)	(17.1)
Goodwill related items	77.9	—	—
Base erosion and anti-abuse tax	13.5	—	—
GILTI	—	6.0	—
Federal tax credits	(23.1)	(2.3)	(2.5)
Change in unrecognized tax benefits	(6.6)	(22.2)	(8.4)
Foreign dividends and Subpart F income, net of foreign tax credits	20.9	4.9	8.6
Foreign earnings taxed at other than federal rate	6.0	1.1	(9.7)
Tax provision adjustments and revisions to prior years' returns	(3.4)	(5.5)	(6.6)
Change in valuation allowances	8.7	9.7	2.4
Total provision for income taxes	$ (144.5)	$ 30.5	$ 16.0

(In millions, unless otherwise noted)

The components of deferred income tax assets and liabilities and the classification of deferred tax balances on the balance sheet were as follows:

	December 31, 2019	December 31, 2018
Deferred tax assets:		
Accounts receivable, inventory and warranty reserves	$ 130.2	$ 45.1
Employee benefits	55.8	28.7
Foreign net operating loss and tax credit carryforwards	523.4	85.8
Federal net operating loss and tax credit carryforwards	152.0	59.0
State net operating loss and tax credit carryforwards	121.0	18.5
Unrecognized tax benefits	42.1	8.0
Interest limitation	43.3	13.5
Capitalized research and development costs	230.1	12.6
Other	72.2	30.8
Total deferred tax assets	1,370.1	302.0
Valuation allowance	(596.6)	(85.1)
Total deferred tax assets, net of valuation allowance	773.5	216.9
Deferred tax liabilities:		
Intangible assets	(815.7)	(205.5)
Property, plant and equipment	(43.8)	(36.4)
Undistributed foreign earnings	(22.6)	(11.8)
Other	(3.4)	(3.7)
Total deferred tax liabilities	(885.5)	(257.4)
Net deferred tax liability	$ (112.0)	$ (40.5)
Deferred taxes recognized on the balance sheet:		
Noncurrent deferred tax asset (included with other noncurrent assets)	103.1	42.8
Noncurrent deferred tax liability	(215.1)	(83.3)
Net deferred tax liability	$ (112.0)	$ (40.5)

The deferred tax asset for federal net operating loss and tax credit carryforwards as of December 31, 2019 relates to $8.4 million of net operating losses carryforwards, which begin to expire in 2028, $114.7 million of research and development credit carryforwards, which begin to expire in 2022 and $28.9 million of U.S. foreign tax credit carryforwards that expire between 2023 and 2025. A valuation allowance of $10.5 million has been established against these deferred tax assets.

The deferred tax asset for state net operating loss and tax credit carryforwards as of December 31, 2019 includes state net operating loss carryforwards (net of federal tax impact) of $65.0 million, which begin to expire in 2022, and state tax credit carryforwards (net of federal tax impact) of $56.0 million which begin to expire in 2020. A valuation allowance of $90.6 million has been established against these and other state income tax related deferred tax assets.

The deferred tax assets for foreign net operating loss and tax credit carryforwards as of December 31, 2019 includes foreign net operating loss carryforwards (net of federal tax effects) of $509.2 million, which will begin to expire in 2020, and foreign tax credit carryforwards (net of federal tax effects) of $14.2 million, which begin to expire in 2023. Certain of these foreign net operating loss carryforwards are subject to local restrictions limiting their utilization. Valuation allowances of $489.9 million have been established related to these foreign deferred tax assets.

In addition to the valuation allowances detailed above, the Company has also established a valuation allowance of $5.6 million against other deferred tax assets.

(In millions, unless otherwise noted)

Following enactment of U.S. tax reform and the associated one-time transition tax, in general, repatriation of foreign earnings to the U.S. can be completed with no incremental U.S. tax. However, repatriation of foreign earnings could subject the Company to U.S. state and non-U.S. jurisdictional taxes (including withholding taxes) on distributions. As of December 31, 2019, the Company has a deferred tax liability of $22.6 million for the estimated foreign and state tax costs associated with the expected repatriation of the Company's undistributed foreign earnings. The unrecorded deferred tax liability for foreign and state tax costs associated with earnings considered permanently reinvested is not material as of December 31, 2019.

The following table reflects a reconciliation of the beginning and end of period amounts of gross unrecognized tax benefits, excluding interest and penalties:

	Year Ended December 31,		
	2019	2018	2017
Balance at beginning of period	$ 20.1	$ 46.6	$ 48.3
Increase related to prior periods	12.3	4.0	9.1
Decrease related to prior periods	(1.2)	(0.7)	(0.7)
Increase related to current periods	8.5	—	1.1
Decrease related to settlements with taxing authorities	(1.9)	(3.9)	(0.8)
Decrease related to lapse in statutes of limitations	(15.0)	(25.9)	(10.4)
Increase related to acquisition	169.1	—	—
Balance at end of period	$ 191.9	$ 20.1	$ 46.6

The Company's liability for unrecognized tax benefits that, if recognized, would favorably affect the effective tax rate in future periods was $147.2 million as of December 31, 2019. The Company operates in numerous jurisdictions worldwide and is subject to routine tax audits on a regular basis. The determination of the Company's unrecognized tax benefits involves significant management judgment regarding interpretation of relevant facts and tax laws in each of these jurisdictions.

Unrecognized tax benefits are reviewed and evaluated on an ongoing basis and may be adjusted for changing facts and circumstances including the lapse of applicable statutes of limitation and closure of tax examinations. Although the timing and outcome of such events are difficult to predict, the Company estimates that the balance of unrecognized tax benefits, excluding the impact of accrued interest and penalties, may be reduced by up to $6.0 million within the next twelve months.

The Company provides for interest and penalties related to unrecognized tax benefits as income tax expense. As of December 31, 2019 and 2018, the Company had accrued $10.5 million and $5.2 million, respectively, for interest and penalties. During the years ended December 31, 2019, 2018 and 2017 the net expense (benefit) for interest and penalties recognized through income tax expense (benefit) was $2.1 million, $(3.8) million and $0.1 million, respectively.

The Company files federal, state and local tax returns with statutes of limitation generally ranging from 3 to 4 years. The Company is generally no longer subject to federal tax examinations for years prior to 2016 or state and local tax examinations for years prior to 2015. Tax returns filed by the Company's significant foreign subsidiaries are generally subject to statutes of limitations of 3 to 7 years and are generally no longer subject to examination for years prior to 2014. In many jurisdictions, tax authorities retain the ability to review prior years' tax returns and to adjust any net operating loss or tax credit carryforwards from these years that are available to be utilized in subsequent periods. During 2019, the Company recognized $16.9 million related to the lapse of applicable statutes of limitations and the conclusion of various domestic and foreign examinations.

(In millions, unless otherwise noted)

The following table presents income tax expense (benefit) related to amounts presented in the other comprehensive income (loss):

	Year Ended December 31,		
	2019	2018	2017
Foreign currency translation	$ (0.9)	$ (1.9)	$ (1.7)
Defined benefit plans	(8.4)	4.0	0.7
Available-for-sale securities	—	—	(1.6)
Total	$ (9.3)	$ 2.1	$ (2.6)

14. SERIES A CONVERTIBLE PREFERRED STOCK

On April 4, 2019, the Company issued and sold 1,000,000 shares of the Convertible Preferred Stock to Carlyle Partners VII S1 Holdings, L.P. (Carlyle) for $1.0 billion, or $1,000 per share, pursuant to an Investment Agreement between the Company and Carlyle, dated November 8, 2018 (the Investment Agreement). In connection with the issuance of the Convertible Preferred Stock, the Company incurred direct and incremental expenses of $3.0 million, including financial advisory fees, closing costs, legal expenses and other offering-related expenses on behalf of Carlyle, and therefore treated these incremental expenses as a deemed dividend during the year ended December 31, 2019.

The Convertible Preferred Stock ranks senior to the shares of the Company's common stock, with respect to dividend rights and rights on the distribution of assets on any voluntary or involuntary liquidation, dissolution or winding up of the affairs of the Company. The Convertible Preferred Stock has a liquidation preference of $1,000 per share. Holders of the Convertible Preferred Stock are entitled to a cumulative dividend at the rate of 5.5% per year, payable quarterly in arrears. If CommScope does not declare and pay a dividend, the dividend rate will increase by 2.5% to 8.0% per year (and that rate will increase by an additional 0.50% every three months until such unpaid dividend is declared and paid, subject to a cap of 11.0% per year) until all accrued but unpaid dividends have been paid in full. Dividends can be paid in cash, in-kind through the issuance of additional shares of Convertible Preferred Stock or any combination of the two, at the Company's option. During the year ended December 31, 2019, the Company authorized $40.7 million in dividends due for the dividend payment dates in the second, third and fourth quarters of 2019. The dividends were paid on July 1, 2019, the first business day following the initial payment date, September 30, 2019, and December 31, 2019, pursuant to the terms of the Certificate of Designations.

The Convertible Preferred Stock is convertible at the option of the holders at any time into shares of CommScope common stock at an initial conversion rate of 36.3636 shares of common stock per share of the Convertible Preferred Stock (equivalent to $27.50 per common share). The conversion rate is subject to customary anti-dilution and other adjustments. At any time after the third anniversary of the issuance of the Convertible Preferred Stock, if the volume weighted average price of CommScope's common stock exceeds the conversion price of $49.50, as may be adjusted pursuant to the Certificate of Designations, for at least thirty trading days in any period of forty-five consecutive trading days (including the final five trading days of any such forty-five-trading day period) all of the Convertible Preferred Stock may be converted at the election of CommScope into the relevant number of shares of CommScope common stock. Pending shareholder approval, to the extent required under Nasdaq listing rules, the issuance of shares of CommScope common stock upon conversion of the Convertible Preferred Stock and the 2,100,000 shares of common stock issuable by CommScope from capacity assumed under the existing share plans of ARRIS in connection with the Acquisition is capped at 19.9% of the CommScope common stock outstanding immediately prior to the Acquisition. On any date during the three months following the eight year and six-month anniversary of the Investment Agreement closing date and the three months following each anniversary thereafter, holders of the Convertible Preferred Stock will have the right to require CommScope to redeem all or any portion of the Convertible Preferred Stock at 100% of the liquidation preference thereof plus all accrued and unpaid dividends. The redemption price is payable, at the Company's option, in cash or a combination of cash and common stock, subject to certain restrictions.

(In millions, unless otherwise noted)

Upon certain change of control events involving CommScope, CommScope has the right, subject to the holder's right to convert prior to such redemption, to redeem all of the Convertible Preferred Stock for the greater of (i) an amount in cash equal to the sum of the liquidation preference of the Convertible Preferred Stock, all accrued but unpaid dividends and, if the applicable redemption date is prior to the fifth anniversary of the first dividend payment date, the present value, discounted at a rate of 10%, of any remaining scheduled dividends through the five year anniversary of the first dividend payment date, assuming CommScope chose to pay such dividends in cash and (ii) the consideration the holders would have received if they had converted their shares of the Convertible Preferred Stock into CommScope common stock immediately prior to the change of control event. To the extent that CommScope does not exercise the redemption right described in the foregoing sentence, following the effective date of any such change of control event, the holders of the Convertible Preferred Stock can require CommScope to repurchase the Convertible Preferred Stock at the greater of (i) an amount in cash equal to 100% of the liquidation preference thereof plus all accrued but unpaid dividends and (ii) the consideration the holders would have received if they had converted their shares of the Convertible Preferred Stock into CommScope common stock immediately prior to the change of control event.

Holders of the Convertible Preferred Stock are entitled to vote with the holders of the Company's common stock on an as-converted basis. Holders of the Convertible Preferred Stock are entitled to a separate class vote with respect to, among other things, amendments to CommScope's organizational documents that have an adverse effect on the Convertible Preferred Stock, issuances by CommScope of securities that are senior to, or equal in priority with, the Convertible Preferred Stock and issuances of shares of the Convertible Preferred Stock after the closing date of the Acquisition, other than shares issued as dividends with respect to shares of the Convertible Preferred Stock.

15. STOCKHOLDERS' EQUITY

Stock Repurchase Program

During the year ended December 31, 2017, the Company repurchased 4.8 million shares of its outstanding common stock at an average cost of $36.50 per share. The Company did not repurchase any of its common stock during the years ended December 31, 2019 or 2018.

Equity-Based Compensation Plans

Effective June 21, 2019, the Company's stockholders approved the 2019 Long-Term Incentive Plan (the 2019 Plan) authorizing 8.0 million shares for issuance, plus additional shares underlying awards outstanding under the predecessor plans that are forfeited or cancelled after the effective date of the 2019 Plan. Awards under the 2019 Plan may include stock options, stock appreciation rights, restricted stock, stock units (including restricted stock units (RSUs) and deferred stock units), performance awards (represents any of the awards already listed with a performance-vesting component), other stock-based awards and cash-based awards. Shares remaining available for grant under the predecessor plans were carried over into the 2019 Plan and all future equity awards will be made from the 2019 Plan. Awards granted prior to June 21, 2019 remain subject to the provisions of the predecessor plans. As of December 31, 2019, there were 4.0 million shares available for future grants under the 2019 Plan.

As of December 31, 2019, $166.9 million of total unrecognized compensation expense related to unvested stock options, restricted stock units (RSUs) and performance share units (PSUs) is expected to be recognized over a remaining weighted average period of 1.5 years. There were no significant capitalized equity-based compensation costs at December 31, 2019.

The following table shows a summary of the equity-based compensation expense included in the Statements of Operations:

	Year Ended December 31,		
	2019	2018	2017
Selling, general and administrative	$ 55.1	$ 34.2	$ 31.8
Cost of sales	13.5	5.7	5.3
Research and development	22.2	5.0	4.7
Total equity-based compensation expense	$ 90.8	$ 44.9	$ 41.8

Stock Options

Stock options are awards that allow the recipient to purchase shares of the Company's common stock at a fixed price. Stock options are granted at an exercise price equal to the Company's stock price at the date of grant. In prior years, these awards have generally vested over three years following the grant date and have a contractual term of ten years.

During 2019, the Company granted 7.4 million stock options that vest over five years with a contractual term of ten years. The awards also contain an accelerated vesting term for a qualifying retirement during the period. Half of these awards vest based on a time-based component and the other half vest based on a performance-based component which is defined for each year but also includes a catchup feature over the five years. The number of shares that is expected to be issued is adjusted based on the probable achievement of the performance target. The final number of shares issued and the related compensation will be based on the final performance metrics.

The following table summarizes the stock option activity (in millions, except per share data and years):

	Shares	Weighted Average Option Exercise Price Per Share	Weighted Average Remaining Contractual Term in Years	Aggregate Intrinsic Value
Options outstanding at December 31, 2018	4.7	$ 15.51		
Granted	7.4	$ 18.47		
Exercised	(0.8)	$ 6.16		
Expired	(0.1)	$ 30.04		
Forfeited	(1.6)	$ 19.47		
Options outstanding at December 31, 2019	9.6	$ 17.70	7.0	$ 18.8
Options vested at December 31, 2019	3.3	$ 14.10	2.8	$ 18.8
Options unvested at December 31, 2019	6.3	$ 19.63	9.3	$ —

The total intrinsic value of options exercised during the years ended December 31, 2019, 2018 and 2017 was $9.8 million, $12.7 million and $31.2 million, respectively.

The exercise prices of outstanding options at December 31, 2019 were in the following ranges (in millions, except per share data and years):

	Options Outstanding			Options Exercisable	
Range of Exercise Prices	Shares	Weighted Average Remaining Contractual Life in years	Weighted Average Exercise Price Per Share	Shares	Weighted Average Exercise Price Per Share
$2.96 to $5.74	2.1	1.1	$ 5.74	2.1	$ 5.74
$5.75 to $22.99	6.0	9.2	$ 18.18	0.1	$ 8.68
$23.00 to $42.32	1.5	6.7	$ 33.11	1.1	$ 31.31
$2.96 to $42.32	9.6	7.0		3.3	$ 14.10

The Company uses the Black-Scholes model to estimate the fair value of stock option awards at the date of grant. Key inputs and assumptions used in the model include the grant date fair value of common stock, exercise price of the award, the expected option term, the risk-free interest rate, stock price volatility, and the Company's projected dividend yield. The expected term represents the period over which the Company's employees are expected to hold their options. The risk-free interest rate reflects the yield on zero-coupon U.S. treasury securities with a term equal to the option's expected term. Expected volatility is derived based on the historical volatility of the Company's stock. The Company's projected dividend yield is zero. The Company believes the valuation technique and the approach utilized to develop the underlying assumptions are appropriate in estimating the fair values of its stock options. Estimates of fair value are not intended to predict actual future events or the value ultimately realized by employees who receive equity awards. Subsequent events are not indicative of the reasonableness of the original estimates of fair value made by the Company.

The following table presents the weighted average assumptions used to estimate the fair value of stock option awards granted:

	Year Ended December 31,		
	2019	2018	2017
Expected option term (in years)	6.5	6.0	6.0
Risk-free interest rate	2.2%	2.7%	2.0%
Expected volatility	40.0%	35.0%	40.0%
Weighted average exercise price	$ 18.47	$ 38.34	$ 38.00
Weighted average fair value at grant date	$ 8.00	$ 14.83	$ 15.72

Restricted Stock Units

RSUs entitle the holder to shares of common stock after a vesting period that generally ranges from one to three years. The fair value of the awards is determined on the grant date based on the Company's stock price.

On April 4, 2019, the Company granted 3.6 million RSUs to ARRIS employees to replace a portion of their outstanding awards under ARRIS equity-compensation plans as of the Acquisition date. These awards assumed the same terms and vesting schedule as the ARRIS RSUs they replaced. In general, these awards are time-vesting over a four-year period, but they contain several provisions that are not in the standard CommScope awards, including restrictive covenants and special age-based provisions for some participants. These awards also contain a provision that accelerates vesting in the event of termination of employment without cause (and for executives, resignation for good reason) within one year following the closing of the Acquisition.

The following table summarizes the RSU activity (in millions, except per share data):

	Restricted Stock Units	Weighted Average Grant Date Fair Value Per Share
Non-vested share units at December 31, 2018	2.0	$ 35.43
Granted	8.4	$ 20.29
Vested and shares issued	(1.9)	$ 28.78
Forfeited	(0.8)	$ 25.48
Non-vested share units at December 31, 2019	7.7	$ 22.30

The weighted average grant date fair value per unit of these awards granted during the years ended December 31, 2019, 2018 and 2017 was $20.29, $37.87 and $37.90, respectively. The total fair value of RSUs that vested during the years ended December 31, 2019, 2018 and 2017 was $56.0 million, $42.1 million and $42.9 million, respectively.

Performance Share Units

PSUs are stock awards in which the number of shares ultimately received by the employee depends on Company performance against specified targets. Such awards typically vest over three years and the number of shares issued can vary from 0% to 200% of the number of PSUs granted, depending on performance. The fair value of each PSU is determined on the date of grant based on the Company's stock price. The ultimate number of shares issued and the related compensation cost recognized is based on the final performance metrics compared to the targets specified in the grants.

In October 2019, the Company awarded 2.3 million PSUs under a special incentive plan based on the Company's performance for the second half of 2019. The special awards vest over one year and the number of shares could vary from 0% to 130% of the number of PSUs granted, depending on performance. A better than target earnings performance was achieved for these PSUs resulting in a favorable performance adjustment.

The following table summarizes the PSU activity (in millions, except per share data):

	Performance Share Units	Weighted Average Grant Date Fair Value Per Share
Non-vested share units at December 31, 2018	0.3	$ 33.52
Granted	2.3	$ 11.19
Vested and shares issued	(0.1)	$ 25.10
Forfeited	(0.1)	$ 18.42
Performance adjustment	0.3	$ 11.19
Non-vested share units at December 31, 2019	2.7	$ 12.47

The weighted average grant date fair value per unit of these awards granted during the years ended December 31, 2019, 2018 and 2017 was $11.19, $38.34 and $38.00, respectively. The total fair value of PSUs that vested during the years ended December 31, 2019, 2018 and 2017 was $2.7 million, $7.9 million, and $2.4 million, respectively.

16. COMMITMENTS AND CONTINGENCIES

The following table summarizes the activity in the product warranty accrual, included in accrued and other liabilities and other noncurrent liabilities:

	Year Ended December 31,		
	2019	2018	2017
Product warranty accrual, beginning of period	$ 15.6	$ 16.9	$ 21.6
Obligation assumed in ARRIS acquisition	57.4	—	—
Provision for warranty claims	18.4	6.2	4.3
Warranty claims paid	(30.4)	(7.4)	(9.1)
Foreign exchange	—	(0.1)	0.1
Product warranty accrual, end of period	$ 61.0	$ 15.6	$ 16.9

The Company is subject to various federal, state, local and foreign laws and regulations governing the use, discharge, disposal and remediation of hazardous materials. Compliance with current laws and regulations has not had, and is not expected to have, a materially adverse effect on the Company's financial condition or results of operations.

Legal Proceedings

The Company is a party to certain intellectual property claims and also periodically receives notices asserting that its products infringe on another party's patents and other intellectual property rights. These claims and assertions, whether against the Company directly or against its customers, could require the Company to pay damages, royalties, stop offering the relevant products and/or cease other activities. The Company may also be called upon to indemnify certain customers for costs related to products sold to such customers. While the outcome of these claims and notices is uncertain and a reasonable estimate of the loss from unfavorable outcomes in these matters cannot be determined, an adverse outcome could result in a material loss.

The Company is also a plaintiff or a defendant in certain other pending legal matters in the normal course of business. Management believes none of these other pending legal matters will have a material adverse effect on the Company's business or financial condition upon final disposition.

On October 15, 2018, the Company intervened as a defendant in Fractus, S.A. (Fractus) v. CommScope Technologies LLC, T-Mobile U.S., Inc., T-Mobile USA, Inc., Verizon Communications, Inc. and Cello Partnership d/b/a Verizon Wireless, which is a consolidated patent infringement action brought by Fractus, in the U.S. District Court for the Eastern District of Texas alleging that the defendants infringed on Fractus' patents on cellular base station antenna technologies (the Fractus Litigation). The jury trial began in October 2019. In order to minimize risk, and without admitting liability, on October 9, 2019, the Company reached an agreement with Fractus for $55.0 million, with $30.0 million payable in January 2020 and $25.0 million payable in June 2020 (the Settlement Payment). Fractus agreed, among other things, to dismiss the Fractus Litigation and release CommScope from all liabilities relating to any claims of infringement of any patents or patent applications owned by Fractus as of October 9, 2019 or within five years thereafter. The Settlement Payment is recorded in accrued and other liabilities in the Consolidated Balance Sheets as of December 31, 2019, and the expense is recorded in cost of sales for the year ended December 31, 2019 in the Consolidated Statements of Operations.

17. INDUSTRY SEGMENTS, MAJOR CUSTOMERS, RELATED PARTY TRANSACTIONS AND GEOGRAPHIC INFORMATION

Segment Information

Following the Acquisition, the Company has the following five reportable segments, which align with the manner in which the business is managed: Connectivity Solutions (Connectivity), Mobility Solutions (Mobility), Customer Premises Equipment (CPE), Network & Cloud (N&C) and Ruckus Networks (Ruckus).

The Connectivity segment provides innovative fiber optic and copper cable and connectivity solutions for use in data centers and business enterprise, telecommunications, cable television and residential broadband networks. The Connectivity portfolio includes network solutions for indoor and outdoor network applications. Indoor network solutions include optical fiber and twisted pair structured cable solutions, intelligent infrastructure management hardware and software and network rack and cabinet enclosures. Outdoor network solutions are used in both local-area and wide-area networks and "last mile" fiber-to-the-home installations, including deployments of fiber-to-the-node, fiber-to-the-premises and fiber-to-the-distribution point to homes, businesses and cell sites.

The Mobility segment provides the integral building blocks for cellular base station sites and related connectivity; indoor, small cell and distributed antenna wireless systems; and wireless network backhaul planning and optimization products and services. Macro cell solutions can be found at wireless tower sites and on rooftops. Metro cell solutions can be found on street poles and on other urban structures. Distributed antenna systems and small cell indoor solutions allow wireless operators to increase spectral efficiency and enhance cellular coverage and capacity in challenging network conditions such as commercial buildings, urban areas, stadiums and transportation systems.

(In millions, unless otherwise noted)

The CPE segment includes subscriber-based solutions that support broadband and video applications connecting cable, telecommunications and satellite service providers to a customer's home and adds wireless connectivity or other wired connections integrating in-home devices together to enable the consumption of internet-based services and the delivery of broadcast, streamed and stored video to televisions and other connected devices. Broadband offerings include devices that provide residential connectivity to a service provider's network, such as digital subscriber line (DSL) and cable modems and telephony and data gateways which incorporate routing and Wi-Fi functionality. Video offerings include set top boxes that support cable, satellite and IPTV content delivery and include products such as digital video recorders (DVRs), high definition set top boxes and hybrid set top devices.

The N&C segment's product solutions include cable modem termination system, video infrastructure, distribution and transmission equipment and cloud solutions that enable facility-based service providers to construct a state-of-the-art residential and metro distribution network. The portfolio also includes a full suite of global services that offer technical support, professional services and system integration to enable solutions sales of the Company's end-to-end product portfolio.

Our Ruckus segment provides converged wired (local area network (LAN)) and wireless (WLAN) networks for enterprises and service providers. Product offerings include indoor and outdoor Wi-Fi and LTE access points, access and aggregation switches; an Internet of Things (IoT) suite, on-premises and cloud-based control and management systems; and software and software-as-a-service (SaaS) applications addressing security, location, reporting and analytics.

The following table provides summary financial information by reportable segment:

	December 31,	
	2019	2018
Identifiable segment-related assets:		
Connectivity	$ 4,188.5	$ 4,258.1
Mobility	1,886.5	1,871.3
CPE	2,178.7	—
N&C	4,473.5	—
Ruckus	1,003.1	—
Total identifiable segment-related assets	13,730.3	6,129.4
Reconciliation to total assets:		
Cash and cash equivalents	598.2	458.2
Deferred income tax assets	103.1	42.9
Total assets	$ 14,431.6	$ 6,630.5

In the first quarter of 2019, the Company changed its measure of segment performance from adjusted operating income to adjusted EBITDA (earnings before interest, income taxes, depreciation and amortization). The Company defines adjusted EBITDA as operating income, adjusted to exclude depreciation, amortization of intangible assets, restructuring costs, asset impairments, equity-based compensation, transaction and integration costs and other items that the Company believes are useful to exclude in the evaluation of operating performance from period to period because these items are not representative of the Company's core business.

(In millions, unless otherwise noted)

The following table provides net sales, adjusted EBITDA, depreciation expense and additions to property, plant and equipment by reportable segment:

	Year Ended December 31, 2019	2018	2017
Net sales:			
Connectivity	$ 2,557.4	$ 2,812.7	$ 2,809.8
Mobility	1,754.2	1,755.8	1,750.8
CPE	2,539.0	—	—
N&C	1,073.6	—	—
Ruckus	420.9	—	—
Consolidated net sales	$ 8,345.1	$ 4,568.5	$ 4,560.6
Segment adjusted EBITDA			
Connectivity	$ 462.1	$ 575.2	$ 581.8
Mobility	380.1	338.4	376.6
CPE	193.7	—	—
N&C	237.0	—	—
Ruckus	24.6	—	—
Total segment adjusted EBITDA	1,297.5	913.6	958.4
Amortization of intangible assets	(593.2)	(264.6)	(271.0)
Restructuring costs, net	(87.7)	(44.0)	(43.8)
Equity-based compensation	(90.8)	(44.9)	(41.8)
Asset impairments	(376.1)	(15.0)	—
Transaction and integration costs	(195.3)	(19.5)	(48.0)
Depreciation	(143.7)	(75.6)	(81.7)
Purchase accounting adjustments	(264.2)	—	—
Patent litigation settlement	(55.0)	—	—
Consolidated operating income (loss)	$ (508.5)	$ 450.0	$ 472.0
Depreciation expense:			
Connectivity	$ 49.9	$ 53.4	$ 58.5
Mobility	22.2	22.2	23.2
CPE	30.2	—	—
N&C	30.6	—	—
Ruckus	10.8	—	—
Consolidated depreciation expense	$ 143.7	$ 75.6	$ 81.7
Additions to property, plant and equipment:			
Connectivity	$ 58.8	$ 59.4	$ 45.0
Mobility	24.0	22.9	23.7
CPE	6.5	—	—
N&C	12.8	—	—
Ruckus	2.0	—	—
Consolidated additions to property, plant and equipment	$ 104.1	$ 82.3	$ 68.7

Customer Information

Net sales to Comcast Corporation and affiliates (Comcast) accounted for 11% of the Company’s net sales during the year ended December 31, 2019. Other than Comcast, no direct customer accounted for 10% or more of the Company’s total net sales during the year ended December 31, 2019. No direct customers accounted for 10% or more of the Company’s accounts receivable as of December 31, 2019.

(In millions, unless otherwise noted)

Net sales to Anixter International Inc. and its affiliates (Anixter) accounted for 11% of the Company's total net sales during each of the years ended December 31, 2018 and 2017. Other than Anixter, no direct customer accounted for 10% or more of the Company's total net sales during the years ended December 31, 2018 or 2017.

Related Party Transactions

See Note 14 for a discussion of our Series A convertible preferred stock issued to Carlyle to finance the Acquisition. Other than transactions related to the Series A convertible preferred stock, there were no material related party transactions for the years ended December 31, 2019, 2018 or 2017.

Geographic Information

Sales to customers located outside of the U.S. comprised 41%, 44% and 46% of total net sales during the years ended December 31, 2019, 2018 and 2017, respectively. Sales by geographic region, based on the destination of product shipments or service provided, were as follows:

	Year Ended December 31,		
	2019	2018	2017
United States	$ 4,923.3	$ 2,539.2	$ 2,449.4
Europe, Middle East and Africa (EMEA)	1,543.6	963.0	942.5
Asia Pacific (APAC)	919.7	735.6	828.3
Caribbean and Latin America (CALA)	650.7	242.9	245.6
Canada	307.8	87.8	94.8
Consolidated net sales	$ 8,345.1	$ 4,568.5	$ 4,560.6

Long-lived assets, excluding intangible assets, consist substantially of property, plant and equipment and right of use assets. The Company's long-lived assets, excluding intangible assets, located in the U.S., EMEA, APAC and CALA regions represented the following percentages of such long-lived assets: 62%, 15%, 17% and 6%, respectively, as of December 31, 2019 and 56%, 18%, 19%, and 7%, respectively, as of December 31, 2018.

18. SUBSEQUENT EVENTS

On February 7, 2020, the Company informed holders of the 2021 Notes that it would redeem $100.0 million aggregate principal amount of the 2021 Notes on February 17, 2020. The redemption price included the accrued and unpaid interest up to the date of the redemption. Following the redemption, $50.0 million aggregate principal amount of the 2021 Notes remained outstanding.

(In millions, unless otherwise noted)

19. QUARTERLY FINANCIAL DATA (UNAUDITED)

	First Quarter 2019	Second Quarter 2019	Third Quarter 2019	Fourth Quarter 2019
Net sales	$ 1,099.5	$ 2,566.7	$ 2,380.2	$ 2,298.7
Gross profit	398.0	660.0	609.9	736.2
Operating income (loss) (1)(2)(3)(4)(5)	90.7	(209.2)	(50.8)	(339.2)
Net loss	(2.3)	(334.0)	(156.5)	(436.7)
Net loss attributable to common stockholders	(2.3)	(350.1)	(170.3)	(450.5)
Basic loss per share	$ (0.01)	$ (1.81)	$ (0.88)	$ (2.32)
Diluted loss per share	$ (0.01)	$ (1.81)	$ (0.88)	$ (2.32)

	First Quarter 2018	Second Quarter 2018	Third Quarter 2018	Fourth Quarter 2018
Net sales	$ 1,120.5	$ 1,239.9	$ 1,150.4	$ 1,057.7
Gross profit	397.8	457.2	409.7	368.6
Operating income (1)(2)(3)(5)	103.7	164.7	132.2	49.4
Net income (loss) (6)	33.7	65.9	63.8	(23.2)
Net income (loss) attributable to common stockholders	33.7	65.9	63.8	(23.2)
Basic earnings (loss) per share	$ 0.18	$ 0.34	$ 0.33	$ (0.12)
Diluted earnings (loss) per share	$ 0.17	$ 0.34	$ 0.33	$ (0.12)

(1) Operating income (loss) for the first, second, third and fourth quarters in 2019 included charges related to restructuring costs of $12.4, $46.4, $19.5 and $9.4, respectively. Operating income for the first, second, third and fourth quarters in 2018 included charges related to restructuring costs of $5.5, $7.2, $7.1 and $24.2, respectively.

(2) Operating income (loss) for the first, second, third and fourth quarters in 2019 included charges related to transaction and integration costs of $20.8, $167.0, $2.2 and $5.3, respectively. Operating income for the first, second, third and fourth quarters in 2018 included charges related to transaction and integration costs of $1.6, $1.0, $2.7 and $14.2, respectively.

(3) Operating income (loss) for the first, second, third and fourth quarters in 2019 included amortization of purchased intangibles of $59.3, $164.1, $163.9 and $205.9. Operating income for the first, second, third and fourth quarter in 2018 included amortization of purchased intangibles of $67.2, $66.4, $65.8 and $65.2.

(4) Operating income (loss) for the second, third and fourth quarters in 2019 included purchase accounting adjustments of $164.1, $108.7 and $(8.6), respectively, and a patent litigation settlement of $55.0 for the third quarter in 2019.

(5) Operating income (loss) for the fourth quarter in 2019 included asset impairment charges of $376.1. Operating income for the fourth quarter in 2018 included an asset impairment charge of $15.0.

(6) Net income (loss) for the fourth quarter in 2018 included employee defined benefit plan termination charges of $24.8 and foreign currency losses of $14.0 resulting from an entity liquidation.

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

Not applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of the Chief Executive Officer (CEO) and Chief Financial Officer (CFO), evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act)) as of the end of the period covered by this report.

Based on this evaluation, our CEO and CFO have concluded that, as of the end of the period covered by this report, these disclosure controls and procedures were effective and operating to provide reasonable assurance that information that we are required to disclose in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the Securities and Exchange Commission, and that such information is accumulated and communicated to our management, including our CEO and CFO, as appropriate, to allow timely decisions regarding required disclosure.

Management's Report on Internal Control over Financial Reporting

The management of CommScope is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rule 13a-15(f) and 15d-15(f) under the Exchange Act, as a process designed by, or under the supervision of, the company's principal executive and principal financial officers and effected by the company's board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of consolidated financial statements for external purposes in accordance with generally accepted accounting principles and 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 the company;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of consolidated 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
- 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 consolidated financial statements.

CommScope's management assessed the effectiveness of CommScope's internal control over financial reporting as of December 31, 2019. In making this assessment, CommScope's management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control – Integrated Framework (2013). Based on this assessment, management concluded that, as of December 31, 2019, CommScope's internal control over financial reporting is effective based on the COSO internal control criteria.

CommScope's independent registered public accounting firm, Ernst & Young LLP, has issued an attestation report on the effectiveness of CommScope's internal control over financial reporting, which is included herein.

Changes in Internal Control over Financial Reporting

In conjunction with the integration of ARRIS, the Company is making changes to processes, policies and other components of its internal control over financial reporting, including the consolidation of such operations into the Company's financial statements. Management continues to make changes to the design of the control procedures relating to ARRIS and assess their effectiveness. Except for the activities described above, there have been no changes in the Company's internal control over financial reporting during the quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Inherent Limitations of Disclosure Controls and Internal Control over Financial Reporting

Because of their inherent limitations, our disclosure controls and procedures and our internal control over financial reporting may not prevent all material errors or fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. The effectiveness of our disclosure controls and procedures and our internal control over financial reporting is subject to risks, including that the controls may become inadequate because of changes in conditions or that the degree of compliance with our policies or procedures may deteriorate.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2020 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

Code of Ethics for Principal Executive and Senior Financial and Accounting Officers

We have adopted the CommScope Holding Company, Inc. Code of Ethics for Principal Executive and Senior Financial and Accounting Officers (the Senior Officer Code of Ethics), a code of ethics that applies to our Chief Executive Officer, Chief Financial Officer and Chief Accounting Officer. The Senior Officer Code of Ethics is publicly available on our web site at *www.commscope.com*. If we make an amendment to, or grant a waiver from, a provision of the Senior Officer Code of Ethics, we will disclose the nature of such waiver or amendment on our web site.

ITEM 11. EXECUTIVE COMPENSATION

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2020 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

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

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2020 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2020 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2020 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a) Documents Filed as Part of this Report:

1. *Audited Consolidated Financial Statements*

   The following consolidated financial statements of CommScope Holding Company, Inc. are included under Part II, Item 8:

   Reports of Independent Registered Public Accounting Firm
   Consolidated Statements of Operations for the Years Ended December 31, 2019, 2018 and 2017
   Consolidated Statements of Comprehensive Income (Loss) for the Years Ended December 31, 2019, 2018 and 2017
   Consolidated Balance Sheets as of December 31, 2019 and 2018
   Consolidated Statements of Cash Flows for the Years Ended December 31, 2019, 2018 and 2017
   Consolidated Statements of Stockholders' Equity for the Years Ended December 31, 2019, 2018 and 2017
   Notes to Consolidated Financial Statements

2. *Financial Statement Schedules*

   All schedules are omitted because they are not applicable or the required information is shown in the financial statements or notes thereto.

3. *List of Exhibits.* See Index of Exhibits included herein.

Index of Exhibits

	Exhibit No.	Description
*	2.1	Stock and Asset Purchase Agreement, dated January 27, 2015, by and among CommScope Holding Company, Inc., CommScope, Inc. and TE Connectivity Ltd. (Incorporated by reference to Exhibit 2.1 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on January 28, 2015).
*	2.2	Bid Conduct Agreement, dated November 8, 2018, among CommScope Holding Company, Inc. and ARRIS International plc (the Bid Conduct Agreement) (Incorporated by reference to Exhibit 2.1 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on November 8, 2018).
*	2.3	First Amendment to Bid Conduct Agreement, dated January 2, 2019, between CommScope Holding Company, Inc. and ARRIS International plc (Incorporated by reference to Exhibit 2.1 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on January 3, 2019).
*	3.1	Amended and Restated Certificate of Incorporation of CommScope Holding Company, Inc. (Incorporated by reference to Exhibit 3.1 of the Registrant's Form 10-Q (File No. 001-36146), filed with the SEC on November 7, 2013).
*	3.2	Fourth Amended and Restated By-Laws of CommScope Holding Company, Inc. (as adopted December 13, 2016) (Incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on December 14, 2016).
*	3.3	Certificate of Designations Designating Series A Preferred Stock (Incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed with the SEC on April 4, 2019).
*	4.1	Indenture governing the 5.000% Senior Notes due 2021 by and among CommScope, Inc. as Issuer, the subsidiary guarantors named therein and Wilmington Trust, National Association, as trustee, dated as of May 30, 2014, (including form of 5.000% Senior Note due 2021) (Incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on June 2, 2014).
*	4.2	Indenture governing the 5.500% Senior Notes due 2024 by and among CommScope, Inc. as Issuer, the subsidiary guarantors named therein and Wilmington Trust, National Association, as trustee, dated as of May 30, 2014, (including form of 5.500% Senior Note due 2024) (Incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on June 2, 2014).
*	4.3	Indenture governing the 6.000% Senior Notes due 2025 by and between the CommScope Technologies Finance LLC and Wilmington Trust, National Association, as trustee, dated as of June 11, 2015 (including form of 6.000% Senior Note due 2025) (Incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on June 12, 2015).
*	4.4	First Supplemental Indenture, dated August 28, 2015, by and among CommScope Technologies LLC, the Guarantors party thereto and Wilmington Trust, National Association, as trustee (Incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on August 28, 2015).
*	4.5	Indenture governing the 5.000% Senior Notes due 2027, by and among CommScope Technologies LLC, the guarantors named therein and Wilmington Trust, National Association, as trustee and as collateral agent, dated as of March 13, 2017, (including form of 5.000% Senior Note due 2027) (Incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on March 13, 2017).

	Exhibit No.	Description
*	4.6	Indenture, dated as of February 19, 2019, by and between the Escrow Issuer and Wilmington Trust, National Association, as trustee, including the form of 8.25% Senior Note due 2027 (Incorporated by reference to Exhibit 4.1 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on February 19, 2019).
*	4.7	First Supplemental Indenture, dated as of April 4, 2019, by and among CommScope, Inc., the guarantors party thereto and Wilmington Trust, National Association, as trustee (Incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed with the SEC on April 4, 2019).
*	4.8	Indenture, dated as of February 19, 2019, by and between the Escrow Issuer and Wilmington Trust, National Association, as trustee and collateral agent, including the form of 5.50% Senior Secured Note due 2024 and form of 6.00% Senior Secured Note due 2026 (Incorporated by reference to Exhibit 4.3 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on February 19, 2019).
*	4.9	First Supplemental Indenture, dated as of April 4, 2019, by and among CommScope, Inc., CommScope Holding Company, Inc., the other guarantors party thereto, Wilmington Trust, National Association, as trustee, and Wilmington Trust, National Association, as collateral agent (Incorporated by reference to Exhibit 4.4 to the Company's Current Report on Form 8-K filed with the SEC on April 4, 2019).
**	4.10	Description of Securities Registered Pursuant to Section 12 of the Exchange Act.
*	10.1	Revolving Credit and Guaranty Agreement, dated as of January 14, 2011, by and among Cedar I Holding Company, Inc. (now CommScope Holding Company, Inc.), CommScope, Inc., as Parent Borrower, the U.S. Co-Borrowers and European Co-Borrowers named therein, the guarantors named therein, the Lenders from time to time party thereto, J.P. Morgan Securities LLC, as Lead Arranger and Bookrunner, JPMorgan Chase Bank, N.A., as US Administrative Agent, and J.P. Morgan Europe Limited, as European Administrative Agent and the Senior Managing Agents and Documentation Agents named therein (the Revolving Credit Facility) (Incorporated by reference to Exhibit 10.1 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.2	Amendment No. 1 to the Revolving Credit Facility, dated as of March 9, 2012, among CommScope, Inc., as Parent Borrower, the U.S. Borrowers, European Co-Borrowers and Guarantors named therein, the Lenders party thereto, JPMorgan Chase Bank, N.A., as U.S. Administrative Agent, and J.P. Morgan Europe Limited, as European Administrative Agent (Incorporated by reference to Exhibit 10.2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.3	Amendment No. 2 to the Revolving Credit Facility, dated as of May 21, 2015, among CommScope, Inc., as Parent Borrower, CommScope Holding Company, Inc., as Holdings, the US Co-Borrowers and European Co-Borrowers named therein, the Lenders party thereto, JPMorgan Chase Bank, N.A., as U.S. Administrative Agent, and J.P. Morgan Europe Limited, as European Administrative Agent (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), originally filed with the SEC on May 22, 2015).
*	10.4	Revolving Credit Facility Pledge and Security Agreement, dated as of January 14, 2011, among CommScope, Inc. (as successor by merger to Cedar I Merger Sub, Inc.) and the additional Grantors party thereto, in favor of JPMorgan Chase Bank, N.A., as collateral agent and as administrative agent for the Secured Parties referred to therein (Incorporated by reference to Exhibit 10.3 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.5	Patent Security Agreement, dated as of January 14, 2011, made by Allen Telecom LLC, Andrew LLC and CommScope, Inc. of North Carolina in favor of JPMorgan Chase Bank, N.A., as Collateral Agent (Incorporated by reference to Exhibit 10.4 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).

	Exhibit No.	Description
*	10.6	Trademark Security Agreement, dated as of January 14, 2011, made by Allen Telecom LLC, Andrew LLC and CommScope, Inc. of North Carolina in favor of JPMorgan Chase Bank, N.A., as Collateral Agent (Incorporated by reference to Exhibit 10.5 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.7	Copyright Security Agreement, dated as of January 14, 2011, made by Allen Telecom LLC, Andrew LLC and CommScope, Inc. of North Carolina in favor of JPMorgan Chase Bank, N.A., as Collateral Agent (Incorporated by reference to Exhibit 10.6 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.8	Credit Agreement, dated as of January 14, 2011, among CommScope, Inc. (as successor by merger to Cedar I Merger Sub, Inc.), as Borrower, CommScope Holding Company, Inc.(as successor by merger to Cedar I Holding Company, Inc.), the Lenders from time to time party thereto, JPMorgan Chase Bank, N.A. as Administrative Agent and Collateral Agent and J.P. Morgan Securities LLC as Arranger and Sole Bookrunner (Incorporated by reference to Exhibit 10.7 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.8.1	Amendment Agreement, dated as of March 7, 2012, among CommScope, Inc., as Borrower, CommScope Holding Company, Inc., the subsidiary guarantors party thereto, the Lenders from time to time party thereto, JPMorgan Chase Bank, N.A. as Administrative Agent and Collateral Agent and J.P. Morgan Securities LLC as Arranger and Sole Bookrunner (Incorporated by reference to Exhibit 10.8 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.8.2	Amendment Agreement, dated as of March 8, 2013, among CommScope, Inc., as Borrower, CommScope Holding Company, Inc., the subsidiary guarantors party thereto, the Lenders from time to time party thereto, JPMorgan Chase Bank, N.A. as Administrative Agent and Collateral Agent , J.P. Morgan Securities LLC and Deutsche Bank Trust Company Americas, as syndication agent (Incorporated by reference to Exhibit 10.9 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.8.3	Amendment No. 3, dated as of December 3, 2013, to the Credit Agreement, dated as of January 14, 2011, among CommScope, Inc., as Borrower, CommScope Holding Company, Inc., the subsidiary guarantors named therein, the several banks and other financial institutions or entities from time to time parties thereto as Lenders, JPMorgan Chase Bank, N.A., as administrative agent and collateral agent and the other agents and arrangers party thereto. (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on December 3, 2013).
*	10.8.4	Amendment Agreement, dated as of October 31, 2016, to the Credit Agreement, dated as of January 11, 2011, among CommScope, Inc., as Borrower, CommScope Holding Company, Inc., as Holdings, the several banks and other financial institutions or entities from time to time parties thereto as Lenders, JPMorgan Chase Bank, N.A., as Administrative Agent and the other agents and arrangers party thereto. (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on October 31, 2016).
*	10.8.5	Amendment Agreement, dated as of May 31, 2017, to the Credit Agreement, dated as of January 11, 2011, among CommScope, Inc., as Borrower, CommScope Holding Company, Inc., as Holdings, the several banks and other financial institutions or entities from time to time parties thereto as Lenders, JPMorgan Chase Bank, N.A., as Administrative Agent and the other agents and arrangers party thereto. (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on May 31, 2017).

	Exhibit No.	Description
*	10.9	Term Loan Credit Facility Pledge and Security Agreement, dated as of January 14, 2011, among CommScope, Inc. (as successor by merger to Cedar I Merger Sub, Inc.) and the additional Grantors party thereto, in favor of JPMorgan Chase Bank, N.A., as collateral agent and as administrative agent for the Secured Parties referred to therein (Incorporated by reference to Exhibit 10.10 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.10	Patent Security Agreement, dated as of January 14, 2011, made by Allen Telecom LLC, Andrew LLC and CommScope, Inc. of North Carolina in favor of JPMorgan Chase Bank, N.A., as Collateral Agent (Incorporated by reference to Exhibit 10.11 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.11	Trademark Security Agreement, dated as of January 14, 2011, made by Allen Telecom LLC, Andrew LLC and CommScope, Inc. of North Carolina in favor of JPMorgan Chase Bank, N.A., as Collateral Agent (Incorporated by reference to Exhibit 10.12 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.12	Copyright Security Agreement, dated as of January 14, 2011, made by Allen Telecom LLC, Andrew LLC and CommScope, Inc. of North Carolina in favor of JPMorgan Chase Bank, N.A., as Collateral Agent (Incorporated by reference to Exhibit 10.13 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.13	Holdings Guaranty, dated as of January 14, 2011, by CommScope Holding Company, Inc. in favor of the Secured Parties referred to therein (Incorporated by reference to Exhibit 10.14 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.14	Subsidiary Guaranty, dated as of January 14, 2011, from the Subsidiary Guarantors named therein in favor of the Secured Parties referred to therein (Incorporated by reference to Exhibit 10.15 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.15	Intercreditor Agreement, dated as of January 14, 2011, by and among CommScope Inc., CommScope Holding Company, Inc., certain Subsidiaries party thereto as a Guarantor, JPMorgan Chase Bank, N.A., as administrative agent and collateral agent for the holders of Revolving Credit Obligations, and JPMorgan Chase Bank, N.A., as administrative agent and collateral agent for the holders of Initial Fixed Asset Obligations (Incorporated by reference to Exhibit 10.16 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), originally filed with the SEC on August 2, 2013).
*	10.16	Incremental Joinder Agreement, dated August 28, 2015, by and among CommScope, Inc., as Borrower, CommScope Holding Company, Inc., as Holdings, the Subsidiary Guarantors party thereto, the lenders party thereto, JPMorgan Chase Bank, N.A. as Administrative Agent and Collateral Agent, and JPMorgan Chase Bank, N.A., as Escrow Administrative Agent (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on August 28, 2015).
*	10.17	Notes Pledge and Security Agreement, dated as of June 11, 2015, among CommScope, Inc., as a Grantor and the additional Grantors party thereto, in favor of Wilmington Trust, National Association, as collateral agent under the Indenture referred to therein (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on June 12, 2015).
*	10.18	Amended and Restated Employment Agreement between Frank M. Drendel and CommScope, Inc., dated January 14, 2011, as amended on September 12, 2013 (Incorporated by reference to Exhibit 10.18 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013).***

	Exhibit No.	Description
*	10.19	Employment Agreement between Marvin S. Edwards, Jr. and CommScope, Inc., dated January 14, 2011, as amended on September 12, 2013 (Incorporated by reference to Exhibit 10.20 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.20	Employment Agreement between Mark A. Olson and CommScope, Inc., dated January 21, 2014 (Incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on January 23, 2014). ***
*	10.21	Amended and Restated Employment Agreement, dated as of August 23, 2016, by and between ARRIS Group, Inc. and Mr. McClelland (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K/A filed with the SEC on April 4, 2019).***
*	10.22	Form of Amended and Restated Severance Protection Agreement between CommScope, Inc. and certain executive officers entered into prior to 2013 (Incorporated by reference to Exhibit 10.21 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.23	Form of Amendment, effective June 3, 2016, to Severance Protection Agreement between CommScope, Inc. and certain executive officers entered into prior to 2013 (Incorporated by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on July 28, 2016). ***
*	10.24	Form of Amended and Restated Severance Protection Agreement between CommScope, Inc. and certain executive officers entered into after 2015 (Incorporated by reference to Exhibit 10.23 of the Registrant's Annual Report on Form 10-K (File No. 001-36146), filed with the SEC on February 20, 2019). ***
*	10.25	Form of Indemnification Agreement (Incorporated by reference to Exhibit 10.22 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.26	Amended and Restated CommScope, Inc. 2006 Long Term Incentive Plan (as amended and restated effective February 28, 2007) (Incorporated by reference to Exhibit 10.25 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.27	Amended and Restated CommScope Holding Company, Inc. 2011 Incentive Plan (as amended and restated effective February 19, 2013) (Incorporated by reference to Exhibit 10.26 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.28	Forms of Nonqualified Stock Option Certificate under the Amended and Restated CommScope Holding Company, Inc. 2011 Incentive Plan (Incorporated by reference to Exhibit 10.31 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.29	CommScope Holding Company, Inc. Amended and Restated 2013 Long-Term Incentive Plan (as amended and restated effective February 21, 2017) (Incorporated by reference to Exhibit 10.28 of the Registrant's Annual Report on Form 10-K (File No. 001-36146), filed with the SEC on February 23, 2017). ***
*	10.30	Form of Restricted Stock Unit Award Certificate under the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (Incorporated by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 30, 2015). ***
*	10.31	Form of Performance Share Unit Award Certificate under the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (Incorporated by reference to Exhibit 10.3 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 30, 2015). ***

	Exhibit No.	Description
*	10.32	Form of Non-Qualified Stock Option Certificate under the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (Incorporated by reference to Exhibit 10.4 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 30, 2015). ***
*	10.33	CommScope Holding Company, Inc. Amendment to Outstanding Options, effective March 7, 2016 (Incorporated by reference to Exhibit 10.5 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 28, 2016). ***
*	10.34	Form of Restricted Stock Unit Award Certificate under the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (for grants in 2016 and later) (Incorporated by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 28, 2016). ***
*	10.35	Form of Performance Share Unit Award Certificate under the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (for grants in 2016 and later) (Incorporated by reference to Exhibit 10.3 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 28, 2016). ***
*	10.36	Form of Non-Qualified Stock Option Certificate under the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (for grants in 2016 and later) (Incorporated by reference to Exhibit 10.4 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 28, 2016). ***
*	10.37	CommScope Holding Company, Inc. Annual Incentive Plan, as amended February 17, 2016 (Incorporated by reference to Exhibit 10.1 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on April 28, 2016). ***
*	10.38	Amended and Restated CommScope, Inc. Supplemental Executive Retirement Plan (as amended and restated effective April 9, 2009) (Incorporated by reference to Exhibit 10.30 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.39	First Amendment, dated January 12, 2011, to Amended and Restated CommScope, Inc. Supplemental Executive Retirement Plan (Incorporated by reference to Exhibit 10.32 of Amendment No. 2 to the Registrant's Registration Statement on Form S-1 (File No. 333-190354), filed with the SEC on September 12, 2013). ***
*	10.40	CommScope Holding Company, Inc. Non-Employee Director Compensation Plan, as amended on November 28, 2017 (Incorporated by reference to Exhibit 10.39 of the Registrant's Annual Report on Form 10-K (File No. 001-36146), filed with the SEC on February 15, 2018).
*	10.41	Form of Restricted Stock Unit Award Certificate under the CommScope Holding Company, Inc. Non-Employee Director Compensation Plan, which is operated as a subplan of the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan (Incorporated by reference to Exhibit 10.34 of the Registrant's Annual Report on Form 10-K (File No. 001-36146), filed with the SEC on February 20, 2014).
*	10.42	Form of Non-Qualified Stock Option Certificate under the CommScope Holding Company, Inc. Amended and Restated 2013 Long-Term Incentive Plan (for grants to senior executive officers in 2019) (Incorporated by reference to Exhibit 10.5 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on August 8, 2019).***
*	10.43	CommScope Holding Company, Inc. Deferred Compensation Plan (as amended and restated effective January 1, 2017) ((Incorporated by reference to Exhibit 10.41 of the Registrant's Annual Report on Form 10-K (File No. 001-36146), filed with the SEC on February 23, 2017). ***
*	10.44	CommScope Holding Company, Inc. 2019 Long-Term Incentive Plan (Incorporated by reference to Exhibit 99.1 to the Company's Registration Statement on Form S-8 (File No. 333-232354), filed with the Commission on June 26, 2019).***

	Exhibit No.	Description
*	10.45	Investment Agreement, dated November 8, 2018, by and between CommScope Holding Company, Inc. and Carlyle Partners VII S1 Holdings, L.P. (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on November 8, 2018).
*	10.46	Commitment Letter, dated November 8, 2018, by and among CommScope Holding Company, Inc., CommScope, Inc., JPMorgan Chase Bank, N.A., Bank of America, N.A., Merrill Lynch, Pierce, Fenner & Smith Incorporated, Deutsche Bank AG New York Branch, Deutsche Bank AG Cayman Islands Branch and Deutsche Bank Securities Inc. (Incorporated by reference to Exhibit 10.2 of the Registrant's Current Report on Form 8-K (File No. 001-36146), filed with the SEC on November 8, 2018).
*	10.47	Registration Rights Agreement, dated as of April 4, 2019, by and between CommScope Holding Company, Inc. and Carlyle Partners VII S1 Holdings, L.P. (Incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed with the SEC on April 4, 2019).
*	10.48	Revolving Credit Agreement, dated as of April 4, 2019, among CommScope Holding Company, Inc., CommScope, Inc., the co-borrowers named therein, JPMorgan Chase Bank, N.A., as administrative agent and collateral agent, and the other agents and lenders party thereto (Incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed with the SEC on April 4, 2019).
*	10.49	Term Loan Credit Agreement, dated as of April 4, 2019, among CommScope, Inc., as the borrower, CommScope Holding Company, Inc., as holdings, JPMorgan Chase Bank, N.A., as administrative agent and collateral agent, and the other agents and lenders party thereto (Incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed with the SEC on April 4, 2019).
*	18.1	Preferability Letter from Ernst & Young LLP, Independent Registered Public Accounting Firm (Incorporated by Reference to Exhibit 18.1 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on May 4, 2017).
*	18.2	Preferability Letter from Ernst & Young LLP, Independent Registered Public Accounting Firm (Incorporated by Reference to Exhibit 18.1 of the Registrant's Quarterly Report on Form 10-Q (File No. 001-36146), filed with the SEC on August 8, 2019).
**	21.1	List of Subsidiaries
**	23.1	Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm
**	31.1	Certification of Principal Executive Officer pursuant to Rule 13a-14(a).
**	31.2	Certification of Principal Financial Officer pursuant to Rule 13a-14(a).
±	32.1	Certification of Principal Executive Officer and Principal Financial Officer Pursuant to 18 U.S.C. Section 1350 as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 (furnished pursuant to Item 601(b)(32)(ii) of Regulation S-K).
†	101.INS	Inline XBRL Instance Document – The instance document does not appear in the interactive data file because its XBRL tags are embedded within the inline XBRL document.
†	101.SCH	Inline XBRL Schema Document, furnished herewith.
†	101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document.
†	101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document.
†	101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document,
†	101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document.

Exhibit No.	Description
104	Cover Page Interactive Data File (embedded within the Inline XBRL document).

* Previously filed

** Filed herewith

*** Management contract or compensatory plan or arrangement.

† In accordance with Rule 406T of Regulation S-T, the information in these exhibits is furnished and deemed not filed or part of a registration statement or prospectus for purposes of Sections 11 or 12 of the Securities Act of 1933, is deemed not filed for purposes of Section 18 of the Exchange Act of 1934, and otherwise is not subject to liability under these sections.

± In accordance with Item 601(b)(32)(ii) of Regulation S-K and SEC Release No. 33-8238 and 34-47986, Final Rule: Management's Reports on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports, the certification furnished in Exhibit 32.1 hereto is deemed to accompany this Form 10-K and will not be deemed "filed" for purposes of Section 18 of the Exchange Act. Such certification will not be deemed to be incorporated by reference into any filings under the Securities Act or the Exchange Act, except to the extent that the registrant specifically incorporates it by reference.

SIGNATURES

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

COMMSCOPE HOLDING COMPANY, INC

DATE: February 20, 2020

BY: /s/ MARVIN S. EDWARDS, JR.
Marvin S. Edwards, Jr.
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Annual Report on Form 10-K has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ MARVIN S. EDWARDS, JR. Marvin S. Edwards, Jr.	President, Chief Executive Officer and Director (Principal Executive Officer)	February 20, 2020
/s/ ALEXANDER W. PEASE Alexander W. Pease	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 20, 2020
/s/ BROOKE B. CLARK Brooke B. Clark	Senior Vice President and Chief Accounting Officer (Principal Accounting Officer)	February 20, 2020
/s/ FRANK M. DRENDEL Frank M. Drendel	Director and Chairman of the Board	February 20, 2020
/s/ AUSTIN A. ADAMS Austin A. Adams	Director	February 20, 2020
/s/ DANIEL F. AKERSON Daniel F. Akerson	Director	February 20, 2020
/s/ CAMPBELL R. DYER Campbell R. Dyer	Director	February 20, 2020
/s/ STEPHEN C. GRAY Stephen C. Gray	Director	February 20, 2020
/s/ L. WILLIAM KRAUSE L. William Krause	Director	February 20, 2020
/s/ JOANNE M. MAGUIRE Joanne M. Maguire	Director	February 20, 2020

/s/ THOMAS J. MANNING Thomas J. Manning	Director	February 20, 2020
/s/ CLAUDIUS E. WATTS IV Claudius E. Watts IV	Director	February 20, 2020
/s/ TIMOTHY T. YATES Timothy T. Yates	Director	February 20, 2020

Exhibit 4.10

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

CommScope Holding Company, Inc. ("CommScope") has one class of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"): our common stock, par value $0.01 per share (the "common stock"). As of February 7, 2020, 194,642,610 shares of our common stock were issued and outstanding.

The following description summarizes the material terms of our common stock. Because it is only a summary, it does not contain all the information that may be important to you. For a complete description of our common stock, you should refer to our Amended and Restated Certificate of Incorporation and our Amended and Restated Bylaws, which have been filed with SEC as exhibits to our Annual Report on Form 10-K to which this description is an exhibit.

Common Stock

Holders of Common Stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders, including the election of directors (other than directors elected by the holders of Series A Preferred Stock voting as a separate class), and do not have cumulative voting rights, which means that holders of a majority of the outstanding shares of Common Stock will be able to elect all of the directors (other than directors elected by the holders of Series A Preferred Stock voting as a separate class), and holders of less than a majority of such shares will be unable to elect any director. Subject to preferences that may be applicable to any outstanding shares of Preferred Stock created by the Board of Directors from time to time, holders of Common Stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by our Board of Directors out of funds legally available for dividend payments.

As a holding company, our ability to pay dividends is subject to our subsidiaries' ability to make distributions to us. Further, the credit agreements governing our New Senior Secured Credit Facilities and the indentures and supplemental indentures governing our 5.00% Senior Notes due 2021, 5.50% Senior Notes due 2024, 6.00% Senior Notes due 2025, 5.00% Senior Notes due 2027, 8.25% Senior Notes due 2027, 5.50% Senior Secured Notes due 2024 and 6.00% Senior Secured Notes due 2026 impose restrictions on our ability to declare dividends on our Common Stock.

The holders of Common Stock have no preferences or rights of conversion, exchange, pre-emption or other subscription rights. There are no redemption or sinking fund provisions applicable to the Common Stock. In the event of any liquidation, dissolution or winding-up of our affairs, holders of Common Stock will be entitled to share ratably in our assets that are remaining after payment or provision for payment of all of our debts and obligations and after liquidation payments to holders of outstanding shares of Preferred Stock, if any, including the Series A Preferred Stock.

Our Certificate of Incorporation provides that our board of directors will be divided into three classes. Each class shall be consist of nearly equal in number as possible, designated as Class I, Class II and Class III. Each director shall be elected to hold office for a term expiring at the annual meeting of stockholders held in the third year following the year of their election; provided that the term of each director shall continue until the election and qualification of a successor and be subject to such director's earlier death, resignation or removal. In the case of any increase or decrease, from time to time, in the authorized number of directors of the Corporation (other than Preferred Stock Directors), the number of directors in each class shall be apportioned as nearly equal as possible. No decrease in the number of directors shall shorten the term of any incumbent director.

Subject to any rights of the holders of shares of any class or series of Preferred Stock to elect directors under specified circumstances, the precise number of directors of the Corporation shall be fixed, and may be altered from time to time, exclusively by a Board resolution adopted by the affirmative vote of a majority of the total number of directors then in office.

Provisions of Our Amended and Restated Certificate of Incorporation, Amended and Restated Bylaws and Delaware Law that May Have an Anti-Takeover Effect

Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws

Certain provisions in our amended and restated certificate of incorporation and amended and restated bylaws summarized below may be deemed to have an anti-takeover effect and may delay, deter or prevent a tender offer or takeover attempt that a stockholder might consider to be in its best interests, including attempts that might result in a premium being paid over the market price for the shares held by stockholders.

Among other things, our amended and restated certificate of incorporation and amended and restated bylaws will:

- authorize shares of common stock, which, to the extent unissued, will be available for future issuance without additional stockholder approval and, under some circumstances, we could use the additional shares to create voting impediments or to frustrate persons seeking to effect a takeover or otherwise gain control by, for example, issuing those shares in private placements to purchasers who might side with our Board of Directors in opposing a hostile takeover bid;
- authorize the issuance of blank check preferred stock that our Board of Directors could, without further stockholder authorization, issue to increase the number of outstanding shares, issue with super voting, special approval, dividend or other rights or preferences and otherwise issue to discourage a takeover attempt;
- limit the ability of stockholders to remove directors only “for cause” if Carlyle and its affiliates collectively cease to own more than 50% of our common stock and require any such removal to be approved by holders of at least three-quarters of the outstanding shares of common stock;
- prohibit our stockholders from calling a special meeting of stockholders if Carlyle and its affiliates collectively cease to own more than 50% of our common stock;
- prohibit stockholder action by written consent, which requires all stockholder actions to be taken at a meeting of our stockholders, if Carlyle and its affiliates collectively cease to own more than 50% of our common stock;
- provide that the Board of Directors is expressly authorized to adopt, alter or repeal our bylaws;
- establish advance notice requirements for nominations for election to our Board of Directors or for proposing matters that can be acted upon by stockholders at stockholder meetings;
- require a stockholder’s notice proposing to nominate a person for election as director to include specific information about the nominating stockholder and the proposed nominee;
- require a stockholder’s notice relating to the conduct of business (other than the nomination of directors) to contain specific information about the business and the proposing stockholder;
- establish a classified Board of Directors, with three classes of directors;
- grant to the Board of Directors the sole power to set the number of directors and to fill any vacancy on the Board; and
- require the approval of holders of at least three-quarters of the outstanding shares of common stock to amend the bylaws and certain provisions of the certificate of incorporation if Carlyle and its affiliates collectively cease to own more than 50% of our common stock.

The foregoing provisions of our amended and restated certificate of incorporation and amended and restated bylaws could discourage potential acquisition proposals and could delay or prevent a change in control and could also affect the price that some investors are willing to pay for our common stock. These provisions are intended to enhance the likelihood of continuity and stability in the composition of the Board of Directors and in the policies formulated by the Board of Directors and to discourage certain types of transactions that may involve an actual or threatened change of control. These provisions are designed to reduce our vulnerability to an unsolicited acquisition proposal and encourage persons seeking to acquire control of our company to first consult with our Board of Directors to negotiate the terms of any proposed business combination or offer. The provisions also are intended to discourage certain tactics that may be used in proxy fights. However, such provisions could have the effect of discouraging others from making tender offers for our shares and, as a consequence, they also may inhibit fluctuations in the market price of our common stock that could result from actual or rumored takeover attempts. Such provisions also may have the effect of preventing changes in our management.

Delaware Takeover Statute

Subject to certain exceptions, Section 203 of the DGCL prohibits a Delaware corporation from engaging in any “business combination” (as defined below) with any “interested stockholder” (as defined below) for a period of three years following the date that such stockholder became an interested stockholder, unless: (1) prior to such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder; (2) on consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares outstanding those shares owned (x) by persons who are directors and also officers and (y) by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or (3) on or subsequent to such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock that is not owned by the interested stockholder.

In our amended and restated certificate of incorporation, we intend to elect not to be governed by Section 203 of the DGCL, as permitted under and pursuant to subsection (b)(3) of Section 203. Section 203 of the DGCL defines “business combination” to include: (1) any merger or consolidation involving the corporation and the interested stockholder; (2) any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder; (3) subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder; (4) any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or (5) the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation. In general, Section 203 defines an “interested stockholder” as any entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person affiliated with or controlling or controlled by such entity or person.

Exhibit 21.1

Subsidiaries of the Registrant

CommScope, Inc.	Delaware (USA)
CommScope, Inc. of North Carolina	North Carolina (USA)
CommScope Technologies LLC	Delaware (USA)
CommScope EMEA Ltd	Ireland
ARRIS US Holdings, Inc.	Delaware (USA)
Ruckus Wireless, Inc.	Delaware (USA)
ARRIS Solutions, Inc.	Delaware (USA)
ARRIS Technology, Inc.	Delaware (USA)
ARRIS Global Services, Inc.	Delaware (USA)
CommScope UK Holdings Ltd	United Kingdom
ARRIS International Ltd	United Kingdom
ARRIS International IP Ltd	United Kingdom

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-3 No. 333-202490) and related Prospectus of CommScope Holding Company, Inc.;
(2) Registration Statement (Form S-3ASR No. 333-230826) and related Prospectus of CommScope Holding Company, Inc.;
(3) Registration Statement (Form S-8 No. 333-191959) pertaining to the CommScope Holding Company, Inc. 2013 Long-Term Incentive Plan, the Amended and Restated CommScope Holding Company, Inc. 2011 Incentive Plan, the Amended and Restated CommScope, Inc. 2006 Long-Term Incentive Plan, the Amended and Restated CommScope, Inc. 1997 Long-Term Incentive Plan, the Andrew Corporation Management Incentive Program, and the Options Granted to Non-Employee Directors Outside of a Plan;
(4) Registration Statement (Form S-8 No. 333-230720) pertaining to the ARRIS International plc 2016 Stock Incentive Plan; and
(5) Registration Statement (Form S-8 No. 333-232354) pertaining to the CommScope Holding Company, Inc. 2019 Long-Term Incentive Plan

of our reports dated February 20, 2020, with respect to the consolidated financial statements of CommScope Holding Company, Inc. and the effectiveness of internal control over financial reporting of CommScope Holding Company, Inc. included in this Annual Report (Form 10-K) of CommScope Holding Company, Inc. for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Charlotte, North Carolina
February 20, 2020

Exhibit 31.1

MANAGEMENT CERTIFICATION

I, Marvin S. Edwards, Jr., certify that:

1. I have reviewed this annual report on Form 10-K of CommScope Holding Company, 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.

Dated: February 20, 2020

/s/ Marvin S. Edwards, Jr.

Name: Marvin S. Edwards, Jr.
Title: President, Chief Executive Officer and Director
(Principal Executive Officer)

Exhibit 31.2

MANAGEMENT CERTIFICATION

I, Alexander W. Pease, certify that:

1. I have reviewed this annual report on Form 10-K of CommScope Holding Company, 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.

Dated: February 20, 2020

/s/ Alexander W. Pease

Name: Alexander W. Pease
Title: Executive Vice President and Chief Financial Officer
(Principal Financial Officer)

Exhibit 32.1

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 CommScope Holding Company, Inc. (the “Company”) on Form 10-K for the year ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), we, Marvin S. Edwards, Jr., President, Chief Executive Officer and Director of the Company, and Alexander W. Pease, Executive Vice President and Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. § 1350 as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

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.

Dated: February 20, 2020

/s/ Marvin S. Edwards, Jr.

Marvin S. Edwards, Jr.
President, Chief Executive Officer and Director
(Principal Executive Officer)

/s/ Alexander W. Pease

Alexander W. Pease
Executive Vice President and Chief Financial Officer
(Principal Financial Officer)