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

FORM 10-K

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

For the fiscal year ended December 31, 2020

☐ **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 001-38267

RIBBON COMMUNICATIONS INC.
(Exact name of Registrant as specified in its charter)

Delaware	**82-1669692**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

6500 Chase Oaks Boulevard, Suite 100, Plano, Texas 75023
(Address of principal executive offices)(Zip Code)

(978) 614-8100
(Registrant's telephone number, including area code)

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, par value $0.0001	RBBN	The Nasdaq Global Select Market

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

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☐ 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 for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

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

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

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

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

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

The aggregate market value of the common stock held by non-affiliates of Ribbon Communications Inc. was approximately $266,209,000 based on the closing price for its common stock on The Nasdaq Global Select Market on June 30, 2020. As of February 22, 2021, the Registrant had 145,556,939 shares of common stock, $0.0001 par value, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive Proxy Statement to be delivered to stockholders in connection with the Registrant's 2021 Annual Meeting of Stockholders are incorporated by reference into Part III of this report.

RIBBON COMMUNICATIONS INC.
FORM 10-K
YEAR ENDED DECEMBER 31, 2020
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Cautionary Note Regarding Forward-Looking Statements

This report contains "forward-looking statements" within the meaning of the U.S. Private Securities Litigation Reform Act of 1995, which are subject to a number of risks and uncertainties. All statements other than statements of historical facts contained in this report, including statements regarding our future results of operations and financial position, expected benefits from our acquisition of ECI Telecom Group Ltd. and the sale of our Kandy Communications business, business strategy, plans and objectives of management for future operations and plans for future product development and manufacturing are forward-looking statements. Without limiting the foregoing, the words "anticipates", "believes", "could", "estimates", "expects", "intends", "may", "plans", "seeks" and other similar language, whether in the negative or affirmative, are intended to identify forward-looking statements, although not all forward looking statements contain these identifying words. Forward-looking statements are based on our current expectations and assumptions regarding our business, the economy and other future conditions. These statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results to be materially different. We therefore caution you against relying on any of these forward-looking statements. Important factors that could cause actual results to differ materially from those in these forward-looking statements are discussed in this report, including in Item 1A., "Risk Factors" of Part I. Any forward-looking statement made by us in this report speaks only as of the date on which this report was first filed. We undertake no obligation to publicly update any forward-looking statement, whether as a result of new information, future developments or otherwise, except as may be required by law.

PART I

Item 1. Business

Company Overview

We are a leading global provider of communications technology to service providers and enterprises. We provide a broad range of software and high-performance hardware products, solutions and services that enable the secure delivery of data and voice communications for residential consumers and for small, medium, and large enterprises and industry verticals such as finance, education, government, utilities, and transportation. Our mission is to create a recognized global technology leader providing cloud-centric solutions that enable the secure exchange of information, with unparalleled scale, performance, and elasticity. We are headquartered in Plano, Texas, and have a global presence, with research and development, sales and support locations in over thirty-five countries around the world.

Company History

The Ribbon name was created by the merger of Sonus Networks, Inc. and GENBAND US LLC ("GENBAND") in October 2017, with both companies specializing in secure high-performance Voice Over Internet Protocol ("VoIP") technology and solutions. Prior to that, GENBAND had acquired assets of Nortel's Carrier division in 2010, which include a world-class engineering and sales team, a broad deployment base of products and technology, and a recognized industry reputation and pedigree with customers around the world.

Since our formation in 2017, we have completed several acquisitions to strengthen and expand our portfolio of product offerings to service providers and enterprises. Recent notable acquisitions include:

- Edgewater Networks Inc. (August 2018): Expanded our portfolio of security and signaling solutions for the enterprise network edge.
- Anova Data, Inc. (February 2019): Expanded our portfolio with additional network optimization, security, and data monetization applications, enabled by an advanced Big Data Analytics and Machine Learning platform.

On March 3, 2020, we completed the transformative acquisition of ECI Telecom Group Ltd. ("ECI"), based in Israel (the "ECI Acquisition"). The ECI Acquisition further expanded our focus and strategy to include optical transport and Internet Protocol ("IP") networking, switching, and routing products and solutions. The ECI Acquisition helped us create an industry-leading communications software and networking company with a comprehensive portfolio of advanced voice, security, data and IP optical networking and transport solutions.

Industry Background

Today's Communications Service Providers ("CSPs") and enterprises are investing in their networks to compete in an ever-changing technology and customer experience landscape driven largely by cloud computing, mobile workforces requiring hyper-connectivity, new high-performance applications and use cases, and an insatiable demand for bandwidth by end-customers and the applications they use. As a result, service providers and enterprises are adding key enabling technologies to their networks for increased flexibility, programmability, scalability, reliability, and to enable new applications and services with an expedited time to market. These investments provide a competitive advantage and bring value-added services to increase network efficiency, increase customer satisfaction and produce new revenue streams. Within these broad industry themes, investment in our products and services is driven by several key industry trends.

Increased Adoption of Cloud Communications and Collaboration

The shift to cloud-based communications began several years ago driven largely by the advantages of running applications in a virtual cloud environment and reducing dependency on on-premise computing technologies. The Coronavirus Disease 2019 ("COVID-19") pandemic has accelerated this trend significantly, driven by the need for more remote working and commerce for many businesses and industries. As a result, businesses and consumers have rapidly shifted from brick-and-mortar facilities and travel, to work-from-home and connect-from-home using cloud communications and collaboration platforms such as Microsoft Teams, Zoom Phone and others, and require these communications platforms to be highly secure and scalable.

Evolution of Communications Service Provider Networks

CSPs of all types continue to face challenges to their businesses because of the significant technological evolution, increasing competition, disruption by Over-the-Top ("OTT") providers (those providing video entertainment over the Internet rather than through traditional cable, telco and satellite networks), and shifts in customer expectations. They also need to drive new revenues with more digital, efficient, automated, secure, and reliable networks driven largely by software, automation, cloud networking, and other technologies such as analytics and machine-learning. All these factors are causing service providers to re-think and evolve, or even over-haul, the way networks are designed, architected, managed, and optimized to deliver services to their customers with disruptive economics. Increasingly, network operators are also pursuing disaggregated solutions, where they have the flexibility to assemble networks based on transport and control subsystems from different vendors. The fourth and fifth generation of broadband cellular technology ("4G" and "5G", respectively), and the corresponding promise of new revenue-generating applications and services for consumers and businesses, are key drivers of investment in the evolution of underlying mobile and fixed network infrastructures, and disruptions providing opportunity for new suppliers to be selected.

Service providers in some global regions, as mandated by governments or voluntarily, are also replacing certain incumbent vendor communications equipment and technology in their networks because of concerns for security. This presents a significant growth and market share opportunity.

Insatiable Demand for Hyper-Connectivity and Bandwidth Driven by New Services, Applications, and the Cloud

Our global information society is overflowing with telecommunications data traffic, for business, entertainment, education, surveillance, industrial control, online retail, and many other applications. These applications, increasingly delivered from the cloud, generate a huge amount of data driven largely by the video and image components. This exponential growth in data traffic is expected to continue and even accelerated, enabled by 5G upgrades to the mobile radio network. New applications will emerge, such as Reality/Virtual Reality ("R/VR"), cloud gaming, tele-health, Internet of Things ("IoT"), and Industry 4.0, all made possible by the massive bandwidth increases, low latency and highly secure infrastructure.

At the foundation, high performance Optical connections and advanced IP networking are needed to keep pace with the advancements in communications. This hyper-connectivity will be a key enabler and deliver disruptive ultra-low cost-per-bit communications within and between networks and the cloud, while also delivering on the promise of latency sensitive networking demanded by many of the applications.

Need for Reliable, Secure, High-Bandwidth Enterprise and Critical Infrastructure Communications

Companies and verticals that are classified as being part of a “critical infrastructure” are defined as those companies whose assets, systems, and networks, whether physical or virtual, are considered vital to a country’s national interest. Critical infrastructure providers are under increasing pressure to support new services, reduce carbon emission, improve security, expand automation, and increase safety. Achieving these goals requires a transition to a modernized, secure communications network that supports both IP and optical transport seamlessly. With a seamless integrated IP and optical transport solution, a critical infrastructure network operator can provide a highly reliable, secure, future proof communications solution optimized for critical industries. An essential requirement for this solution includes a security suite that incorporates state-of-the-art operational technologies protection measures, giving operators extra confidence in the security of their network.

Data is the lifeblood of any business and it must be easily accessible across the enterprise to power business applications and to support services to end-customers. It must also be replicated across multiple locations for business continuity and disaster recovery and must be protected from inappropriate access, theft, and corruption. Enterprises deploy optical networking, secured by optical encryption, to attain the needed performance and security. Similarly, command and control groups within today’s armed forces have a need for high performance secure networks as their strategic sensors and assault systems are becoming more integrated. In this ecosystem, effective decision-making requires the pooling and analysis of data from a vast array of sensors and other information sources. The data must be delivered securely, in real-time, to wherever it is required. These solutions integrate intelligent optical transport with agile IP networking to provide a converged, secure, communication network.

Addressing the “Digital Divide” with Rural Broadband and High-Speed Internet Connectivity

Governments in many countries around the world are investing to address and help close the digital divide and extend ultra-broadband services and connectivity to underserved communities. As an example, in the United States, the FCC Rural Digital Opportunity Fund ("RDOF"), the 5G Fund for Rural America, and the USDA Rural Development Broadband ReConnect Program expect to provide billions of dollars in funding to deliver broadband connectivity to rural communities in the U.S.

Whether working or learning from home, streaming 4K television, or playing the latest online video games, rural subscribers demand dependable, high-speed Internet access to participate and thrive in the digital world. Forward-looking service providers are taking advantage of government funding programs to expand network capacity and transform the communities they serve. Next-generation rural broadband networks help service providers grow their revenues by extending service reach and diversity, and by satisfying the massive pent-up demand for high-speed internet connectivity. Next-generation broadband networks will also leverage new technologies like fixed-wireless access, while laying the foundation for future revenue opportunities like 5G backhaul transport services.

Strategy Overview

Our mission is to create a recognized global technology leader providing cloud-centric solutions that enable the secure exchange of information, with unparalleled scale, performance, and elasticity. To realize this mission, we have begun the implementation of a focused strategy for our business underpinned by our transformative ECI Acquisition.

- *Operational Integration* - A key step of the strategy includes continuing to successfully drive the integration of ECI and Ribbon to achieve best-in-class operational efficiencies. We have made significant progress, including a revamped internal organization aligned along a business unit model with regional sales teams and integrated corporate functions, as well as the addition of new experienced members to our leadership team. The first phase of integration is completed, and we expect to continue the additional systems integration and process alignment activity in 2021.
- Intellectual Property and Technology Integration - Beyond operational integration, we continue to explore opportunities to blend the intellectual property and technological know-how underlying the classic Ribbon business with that acquired as part of the ECI Acquisition to develop new products and services to meet the new challenges faced by our customers.
- *Cross-Selling* - We are laser-focused on marketing and selling our combined post-acquisition broad portfolio to our global deployed base of service provider and enterprise customers to expand our presence and share of the larger IP and Optical networking and transport market and cross-sell the complete portfolio.
- *North American IP Optical Networks Market Share* - We expect to unlock the value of the former ECI portfolio by growing IP Optical Networks market share in the North American market by leveraging the extensive deployment base and ongoing business that we have with service providers and enterprise customers. We have already experienced some early cross-selling successes with new IP Optical customer wins announced in the second half of 2020.
- *Participate in the 5G Opportunity* - The ECI Acquisition has also advanced our strategy of expanding into the service provider 5G data domain with the IP Optical Networks portfolio bundled with network analytics and intelligence, and security offerings. We believe 5G is a multi-year opportunity as global service providers roll out the new capital-intensive technology and build out the needed network infrastructure over the next decade. We want to be at the forefront of preparing our customers for the deployment of 5G on two major fronts: providing for metro, backhaul and long-haul transport and networking solutions in service provider networks, industrial verticals, and critical infrastructure; and supporting their needs as new applications, including IoT and AI, become a reality with 5G.
- *Software-Centric and Cloud-Native Offerings* - The value of virtual, cloud-native, and software-driven solutions deployable in the cloud has only grown because of the COVID-19 pandemic, which underscores another area of major focus for us. As a strategy, we continue to aggressively transition our product portfolio and business model towards more software, cloud-native offerings and as-a-Service selling model. This transition is instrumental in improving profitability and competitiveness, and growing the recurring revenue portion of our business.
- *Edge Offerings* - The market need and growth rate are higher at the network edge than at the core. We focus on growing this area of our business through our enterprise edge solutions, which are typically geared towards small and medium enterprises, building on our partnerships with key solutions providers such as Microsoft, as well as other popular unified communications and collaboration ("UC&C") platforms such as Zoom Phone and similar service provider UC&C offerings.
- *Partnerships* - We continually look to form industry partnerships that will enhance our current solution offerings to our customers.
- *Focus* - We maintain a constant feedback loop to ensure we stay focused on activities that support the strategy of our main business segments and ensure our investments in research and development are directly aligned to these goals. As part of this strategy, we completed the sale of our Kandy Communications business in December 2020 to American Virtual Cloud Technologies, Inc. ("AVCT"). We believe that the sale enables us to be even more focused on executing

our service provider and enterprise strategy to the benefit of our customers while allowing AVCT to unlock Kandy's true value and strong potential and capitalize on the momentum the business has established. As part of the transaction, we became an investor in AVCT, which means that we have a continued opportunity to capitalize on the continued success of Kandy. We believe execution on this multi-faceted strategy will strengthen our financial foundation, will continue to improve our relationships and collaboration with our customers, and will further align us with our key stakeholders - customers, partners, employees, and investors.

Customers

Our customers are comprised of a diverse set of service providers and enterprises located in over 140 countries around the world. Service provider customers include telephone companies ("telcos") offering fixed and wireless communications services, cable Multi-System Operators ("MSOs") and Communications as a Service providers. Our service provider customers include many of the largest CSPs globally. Enterprise customers include small, medium, and large businesses and industry verticals such as transportation, utilities, government/public sector, finance, and education.

Customers trust us to solve their most challenging communications requirements, enabling people and devices to connect anytime, anywhere. Our customer-centric culture shapes all of our activities and inspires our team members to make a positive impact with our clients, investors, and communities.

In the year ended December 31, 2020, Verizon Communications Inc. ("Verizon") accounted for approximately 15% of our revenue. Verizon is a service provider that offers interconnect, fixed line and mobile communications services, and our software solutions are sold across their business divisions supporting their large enterprises, SMB and consumer telecommunications and cable-related offerings. Our top five customers represented approximately 34% of our revenue in the year ended December 31, 2020.

Segment Information

Effective in the fourth quarter of 2020 and in connection with the ECI Acquisition, our Chief Operating Decision Maker ("CODM") began to assess our performance based on the performance of two separate organizations within the Company: the Cloud and Edge segment ("Cloud and Edge") and the IP Optical Networks segment ("IP Optical Networks"). The Cloud and Edge segment is primarily comprised of the legacy Ribbon business and the IP Optical Networks segment is primarily comprised of the legacy ECI business. We had previously operated in a single segment.

Cloud and Edge Business Segment

The Cloud and Edge segment provides secure and reliable software and hardware products, solutions, and services for enabling VoIP communications, Voice Over LTE ("VoLTE") and Voice Over 5G ("VoNR") communications, and Unified Communications and Collaboration services to both service provider and enterprise customers. Our Cloud and Edge products are increasingly software-centric and cloud-native for deployment on private, public or hybrid cloud infrastructures, in data centers, on enterprise premises, and within service provider private networks.

Cloud and Edge Products and Solutions

Our Cloud and Edge portfolio delivers multiple solutions for enabling VoIP, VoLTE, VoNR, and UC&C for a broad range of service provider and enterprise customers. The solutions provided with this portfolio include those for:

- Securing and providing resilient connectivity and calling via direct routing for Microsoft Teams, Zoom and other cloud-based UC&C applications.
- Securing service provider hosted and managed unified communications ("UC") services.
- Securing network interconnects for communications services.
- Network transformation of fixed service provider voice services networks to help evolve, consolidate, and modernize legacy networks to VoIP and virtualized network environments.
- Implementing IP Multimedia Subsystem ("IMS") networks required by mobile service providers for VoLTE service deployments and for 5G voice services.

- Modernizing, evolving, and securing enterprise and industry vertical UC environments, supporting both on-premises and cloud-based deployments.
- Securing voice sessions and protecting VoIP communications connectivity infrastructures, contact centers, Private Branch Exchanges ("PBX") and media servers.
- Providing identity assurance that helps mitigate robocalls, prevent fraud by determining phone caller identity, intent, and reputation.
- Analytics to provide visibility, security, and service assurance to enhance communication network operations and customer experiences.

Our Cloud and Edge market-leading product portfolio consists of two main categories – Session Border Controller ("SBC") products and Network Transformation products:

Our SBC product portfolio encompasses a full range of deployment platforms including:

- High performance carrier-grade compute platforms leveraging the latest advancements in silicon including NVIDIA GPU processors.
- Feature rich enterprise software products for deployment in both private and public cloud environments such as Amazon Web Services ("AWS"), Microsoft Azure and Google Cloud Platform ("GCP").
- Fully cloud-native implementation supporting as-a-Service ("aaS") business models.
- On-premises dedicated appliances that scale up and down to meet the most demanding performance and security requirements.

Our SBC portfolio consists of the following categories of products:

- Core network SBCs that are deployable by customers in their core networks, or on private or public clouds, and used to identify, manage, and protect voice communications traffic as it moves through and between communication networks. SBCs secure and interwork different voice communications protocols at IP network boundaries, both within and between service provider and enterprise networks. The portfolio also includes Policy and Routing products that work in heterogeneous voice networks, and are used to intelligently manage communications sessions based on multiple policies such as least cost and Quality of Service routing, media type, source or destination, and time of day or week.
- Enterprise Session Border Controllers and Edge products, deployable on premises or in the cloud, to securely and simply enable the deployment and migration to cloud-based UC&C applications such as Microsoft Teams, Zoom Phone and service provider UC&C offerings. Enterprise SBCs provide service assurance and visibility within the enterprise for service-provider hosted and managed UC services. Offerings in this portion of our portfolio include Ribbon Connect for Microsoft Teams Direct Routing, a cloud-based aaS offering for securing calls to the public telephone network from the enterprise.
- Ribbon Call Trust™ is an aaS offering for providing identity assurance. The identity assurance portfolio, using information from deployed network elements including SBCs, helps mitigate robocalls and prevent fraud by determining phone caller identity, intent, and reputation. With this information, it is possible to help determine if a call is from a legitimate person, for a legitimate purpose, and without malicious intent. Our customers utilize these capabilities to provide a better call experiences to their end-customers.
- A cloud-native Analytics Platform with applications that aid customers in gathering actionable intelligence from their communications network elements, including SBCs in the core and edge of their networks, to provide them with network performance visibility, service assurance, security, and fraud mitigation.

Our Network Transformation product portfolio is deployed in the most demanding environments and enables the modernization of fixed, mobile and enterprise voice communications networks to support the next generation of IP-based voice communications services and includes multiple software-centric platforms and products including:

- Signaling products that provide network signaling for communications services.
- Call Controllers that provide call processing within networks for voice communications services and applications.
- Media Gateways that perform the interworking or translation of media, or voice sessions and the corresponding network protocols both within and across VoIP and legacy communications networks, and use codecs (coder-decoder) and digital signal processors to do so.
- A multi-tenant and highly scalable Application Server that enables the deployment of VoIP and UC&C services and applications.

Cloud and Edge Competition

Competition in the market for the Cloud and Edge portfolio remains strong. The market is shifting from an environment dominated by a few large telecommunications legacy hardware equipment companies, such as Ericsson LM Telephone Company ("Ericsson"), Huawei Technologies Co. Ltd. ("Huawei"), and Nokia Corporation ("Nokia"), to a market that is characterized by network function virtualization, hybrid private public cloud compute environments, and open interoperable interfaces. We believe this shift creates opportunities for us to differentiate and gain share from competitors such as:

- Huawei, Ericsson, Nokia, Oracle Corporation, Cisco Systems, Inc. ("Cisco") and AudioCodes Ltd. for our SBCs, Enterprise Edge products and Ribbon Connect.
- Neustar, Inc., Metaswitch Networks (acquired by Microsoft) ("Metaswitch"), TransNexus, Inc. and Transaction Network Services, Inc. ("TNS") for our Identity Assurance and Call Trust offerings.
- Guavus, Inc., NETSCOUT Systems, Inc., Niometrics Pte Ltd, Empirix Inc. and Ericsson for our Analytics offerings.
- Huawei, Metaswitch (acquired by Microsoft), Nokia and Ericsson for our Network Transformation offerings.

Other smaller private and public companies are also focusing on similar market opportunities. Mergers among any of the above companies or other competitors, as well as additional competitors with significant financial resources entering our markets, could further intensify competition. Mergers between service providers may also increase competition for a smaller number of more concentrated customers and channels for products and solutions.

IP Optical Networks Business Segment

The global information society is generating a very high volume of telecommunications traffic, for business, entertainment, education, surveillance, industrial control, and other applications. Technologies like 5G, distributed cloud computing and corresponding applications are predicted to continue this exponential traffic growth. IP and Optical networks are at the foundation of this information economy, and indeed are one of its key enablers, delivering ultra-low cost-per-bit transport and multi-service flexibility. Our IP Optical Networks segment provides high-performance, secure, and reliable hardware and software products and solutions for IP networking, switching, and routing, and optical transport. This portfolio is offered to service provider, enterprise and industry verticals with critical transport network infrastructures including utilities, government, defense, transportation and education and research.

IP Optical Networks Products and Solutions

Our IP Optical Networks portfolio delivers multiple solutions spanning access, metro, regional, and long-haul geographies, and using ring, mesh, and point-to-point topologies. IP Multiprotocol Label Switching ("MPLS") and other protocols provide a broad range of networking services for our customers. Our solutions for optical and IP transport and networking include 5G-native solutions for mobile-backhaul, metro and edge aggregation, core networking, data center interconnect, legacy network transformation and transport solutions for wholesale carriers. High availability and security also make the solutions ideal for critical infrastructure delivering mission-critical services.

Our IP Optical Networks market-leading and multi-layer product portfolio consists of:

- Our Neptune IP networking, switching, and routing products that provide multiservice aggregation and IP transport based on IP MPLS and segment routing, for seamlessly evolving to new IP-based networks and 5G services. Our Neptune product line streamlines end-to-end service delivery by combining carrier-grade service assurance, visibility,

and control with efficient multiservice IP networking. Neptune offers converged support for Ethernet, MPLS, MPLS-TP (traffic profile), Segment Routing, Flexible Ethernet ("FlexE"), Time Division Multiplexing Circuit Emulation Services ("TDM CES"), and Optical Transport Network ("OTN") to provide a powerful, flexible solution for high-performance services. We believe this is a perfect fit for operators looking for solutions for multiservice aggregation, mobile backhaul and critical infrastructures. With TDM CES support, legacy services are easily migrated onto the Neptune platform. In addition, IP MPLS, Software-Defined Networking ("SDN"), Network Functions Virtualization ("NFV"), and enhanced timing and synchronization capabilities make the high-capacity Neptune platform ideal for 5G transport in a converged and distributed metro-transport environment.

- Our Apollo products provide programmable and open OTN capabilities with Dense Wavelength Division Multiplexing ("DWDM") support. The OTN layer maps Ethernet and other services into bit streams for transparent optical transmission, and DWDM routes wavelengths of light containing the OTN-encapsulated bit streams across wide areas, greatly increasing the efficiency and capacity of fiber facilities. Our Apollo hardware and software products deliver reconfigurable and programmable low-latency optical transport that simultaneously speeds up provisioning of new services while maximizing traffic throughput at the lowest cost per bit. The Apollo product line provides state-of-the-art transparent and flexible DWDM and OTN transport with integrated packet switching capabilities. A modular architecture allows optimized solutions across access, metro, regional, and long-haul networks. Apollo combines high performance, low-latency OTN transport, and OTN switching with software-configurable optical routing for maximum efficiency. Apollo is “self-aware” with intelligent reporting for efficient and SDN-ready operations. Apollo also provides deployment choice, whether as an integrated solution or as standalone subsystems for disaggregated multivendor solutions. A key of security feature of Apollo used broadly in critical infrastructure and enterprise deployments is Layer 1 Optical Encryption supported by standard and Post Quantum Computing algorithms.

- The Muse SDN multi-layer Domain Orchestrator is a suite of cloud-native applications that deliver SDN domain orchestration for underlying Neptune IP and Apollo Optical networks. This covers complete lifecycle management and automation to speed up time to revenue, reduce Total Cost of Ownership ("TCO"), and facilitate integration into wider ecosystems. It is powered by a carrier-grade, cloud-native Platform as a Service ("PaaS") and works in conjunction with our LightSOFT™ network management system. Built for a 5G services world, Muse enables network operators to programmatically configure and combine hard and soft slicing technologies to create slices appropriate to different sets of 5G-enabled services and customer sub-networks. Then, using a rich set of tools, operators can design, provision, and assure a broad array of services on top of the slices.

IP Optical Networks Competition

Competition in the markets addressed by our IP Optical Networks products is strong. The market is shifting from an ecosystem dominated by a few large telecommunications legacy hardware equipment companies with proprietary solutions such as Ciena, Cisco, and Nokia, to a market that is characterized by a combination of closed and open solutions, software-defined networking, and dis-aggregation ready for next generation networks, services and applications including 5G. Leveraging commercial technology, we believe this shift creates opportunities for us to increase our share as compared to direct competitors such as Cisco, Juniper Networks, Inc., Huawei, Nokia, Ciena Corporation, Infinera Corporation, ADVA Optical Networking SE, and Fujitsu Limited. We believe a key differentiation from these competitors is our optimized and integrated multi-layer IP optical solutions.

Services and Support

As service providers and enterprises increasingly adopt IP-based voice, multimedia, IP and optical transport networks and 5G communications solutions for their markets, they are challenged to find the expertise to install, maintain, and repair these platforms. We have a rich history of providing a broad offering of service-based solutions to complement our products and to help service providers and enterprises grow revenues, serve customers, reduce costs, and improve productivity. Our Global Services organization provides a wide range of services to enable our customers to achieve those goals. Professional and Project Management Services include hundreds of VoIP, IMS voice services and IP and Optical networking specialists and partners offering technical depth, network breadth and tools to assist customers in all aspects of network modernization, design, and deployment. Our Maintenance Support offerings deliver a comprehensive support strategy for all products, applications, and solutions purchased. Our Managed Services offer proactive monitoring to keep customers' production communications running smoothly so they can concentrate on running their business. In addition, our Education Services help ensure customers have the technical knowledge and skills necessary to achieve service readiness and delivery goals to accelerate time-to-market, manage costs, and get the most out of our products and solutions that they use.

Sales and Marketing

We sell our portfolio of products and solutions to service provider and enterprise customers around the globe through both direct sales and indirectly through channel partners, including independent resellers, distributors, and system integrators. Most of our sales to service providers are done directly and most sales to enterprises are done through channel partners. Our direct sales team is organized geographically and by major customers and market to support customer requirements. The sales organization is divided into two regional sales teams – one responsible for the Americas, and one responsible for EMEA (Europe, Middle East and Africa) and APAC (Asia Pacific, including India). Our sales teams sell our full portfolio of products and solutions from both segments to customers in each salesperson's assigned region. Our direct sales force and resellers are supported by a highly trained technical sales engineering staff who work closely with our customers to develop technical proposals and design systems to optimize system performance and economic benefits for our customers.

Our marketing organization is responsible for building awareness of our brand in the markets served and driving engagement with our strategies, solutions, and products. It promotes our brand and portfolio value propositions to key stakeholders, including our customers, channel partners, and prospects globally. The organization develops all of our corporate and portfolio messaging for different target audiences, and manages all customer and industry communication channels, including public relations, digital content (including for the web and social media), events, and trade shows, as well as demand generation and account-based marketing campaigns in conjunction with our sales force.

Manufacturing

We rely on leading global contract manufacturers and original design manufacturers to manufacture, assemble, test and ship our products. We enjoy long-term relationships with our contract manufacturers and regularly review business relationships in an attempt to reduce cost of goods and supply risks. We employ formal quality, environmental and ethics management programs with all of our contract manufacturers.

Our leading manufacturers have presence in multiple international locations. This enables us to implement a flexible manufacturing and logistics landscape for each product line and target markets. This structure also facilitates redundancy and business continuity to mitigate risks related to adverse trade tariff, taxation, and natural disasters. Moreover, we wholly own the intellectual property related to fabrication files, assembly, testing algorithms and manufacturing operating procedures, thus reducing sole dependency on a specific contract manufacturer.

Inventory Suppliers and Sourcing

We work with strategic global suppliers for our key integrated circuit components, systems, and software. Certain of our networking products use third-party optical modules embedded on board or configured as pluggable units. These modules are designed and manufactured by leading optical technology vendors and supplied to us based on agreed-upon our controlled performance specifications.

Our policy is to purchase major components directly from original suppliers or from authorized distributors. We regularly review market trends and volume demand for newly introduced products with our suppliers and distributors to negotiate reduced component pricing as the products mature. We carefully manage end-of-sale and end-of-life transitions to maximize return on investment and minimize wasted material, while maximizing customer satisfaction. When we must source such end-of-life components from distributors and brokers, we typically encounter increased component pricing. In some cases, when such parts cannot be sourced reliably any longer in the open market, we undertake costly redesign efforts with alternative components.

In order to maintain competitive lead time for our customers, we employ sophisticated demand and supply management systems. We also utilize agility and safety stock processes to meet higher-than-forecasted customer demand to stock raw material and sub-assembly inventory. We occasionally experience unforeseen demand drops of certain products or sub-assemblies due to technology evolution, customer consumption behavior, or shortened product lifecycle. We regularly review current inventory levels to ensure adequate reserves for excess and obsolete inventory arising from shortened product life cycle or demand drops.

Research and Development

Our global research and development ("R&D") workforce is geographically distributed across a balanced set of high-cost and low-cost centers of excellence. This allows us to distribute work in a cost-effective manner and provide time-zone sensitive

support to our global sales team and customers. We supplement our deep in-house expertise with a small set of long-term contracting partners, allowing us to flex up and down as required to match customer demand.

To maintain our position as a technology leader, we continue to invest in our development methodologies, leveraging and adopting industry best practices in the domains of DevOPs, Continuous Integration, Security and Test Automation.

In addition to delivering product-specific feature requests from our customers, our R&D resources that are focused on our Cloud and Edge business segment continue to focus on leading edge technology that will allow our customers to move from purpose-built appliances to fully virtualized solutions, including private and public cloud deployment models as they modernize their networks. We are also investing in aaS variants of our products, fully integrated with cloud-native operational models.

Our IP Optical Networks R&D team continues to focus on empowering our customers with better performance and cost-efficient solutions, improved cost-per-bit, and reduced power and space requirements to lower operating costs. We create innovative solutions that address the exponential increases in bandwidth consumption with improving operational efficiency. Our unique value-add is demonstrated by advanced well-integrated optical and packet solutions managed by state-of-the-art cross platform SDN management system.

We leverage modern technologies and industry best practices across all our products and solutions to provide security at each layer of the solution, enabling end to end security of the overall system. We continue to invest in analytics and automation to allow our customers to operate our solutions at scale with end-to-end visibility and control over the robustness, security, and efficiency of the solution.

Intellectual Property

We believe intellectual property is fundamental to our business and success, and we depend upon our ability to develop, maintain and protect our technology. We seek to safeguard our investments in technology and rely on a combination of U.S. and foreign patent, trademark, trade secret and copyright law and contractual restrictions to protect the proprietary aspects of our technology. As of December 31, 2020, we had been issued 693 patents in the U.S, which expire between 2021 and 2039, and had 64 in-process patent applications in the U.S. As of such date, we also had 314 issued patents in foreign jurisdictions, and had 35 patent applications. As of December 31, 2020, we had 34 trademarks registered in the U.S. and 99 trademarks registered in foreign jurisdictions.

In addition to the protections described above, we seek to safeguard our intellectual property by employing measures to protect against the unauthorized use or disclosure of the source and object code for our software, documentation and other written materials; licensing our software pursuant to signed license agreements, which impose restrictions on others' ability to use our software; and seeking to limit disclosure of our intellectual property by requiring employees and consultants with access to our proprietary information to execute confidentiality agreements.

We have incorporated third-party licensed technology into certain of our products and may be required to license additional technology from third parties to develop new products or to enhance existing products. Although many companies are often willing to enter into such licensing agreements, no assurance can be provided that such licenses can be negotiated on reasonable terms, or at all. The failure to enter into technology development or licensing agreements, when necessary, could limit our ability to develop new products and could harm our business.

Despite our efforts to protect our technology and proprietary rights as discussed above, unauthorized parties may still obtain and use our technology and software. We have defended, and intend to vigorously defend when necessary, our intellectual property from infringement. Other companies in the communications and technology industries frequently threaten litigation, or file suit against us (directly or indirectly through customers to whom we could owe indemnification) based on allegations of infringement or other violations of intellectual property rights. We are currently subject to, and expect to face in the future, allegations that we have infringed the intellectual property rights of third parties, including those of our competitors and non-practicing entities.

Regulatory Considerations

As a company with global operations, we are subject to complex U.S. and foreign laws and regulations, including trade regulations, tariffs, import and export regulations, anti-bribery and corruption laws, antitrust or competition laws, cybersecurity, privacy and data protection, among others. In addition, our operations are also subject to a number of environmental regulations such as the Waste Electrical and Electronic Equipment Directive ("WEEE") and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment ("RoHS"). We have developed policies and

procedures to assist us in complying with these laws and regulations. Our historical compliance costs, including those related to environmental regulations, have not resulted in a material adverse effect on our business, results of operations or financial condition. We expect the laws and regulations to which we are subject will continue to increase and the future costs of compliance with existing or new regulations could materially impact our business in the future.

Our Employees

As of December 31, 2020, we had a total of 3,784 employees worldwide, of which approximately 30% were located in North America, 37% were located in our APAC region, 29% were located in our EMEA region and 3% were located in Central and Latin America. Approximately 21% of our employees identify as female. As an international company, we are committed to maintaining a diverse and inclusive workforce, and empowering all employees. Approximately 720 employees are covered by collective bargaining agreements or works councils and we believe that our relations with the labor unions are generally good.

Our values are focused on teamwork, passion (taking pride in our achievements), being a trusted advisor to our customers, innovation and being "TRUE" - Transparent, Respectful, Unpretentious and Empowered. Engaging our employees includes aligning with these values and providing a workplace that is one in which we all work toward shared objectives that contribute to a better world and a better society. We engage our employees by providing opportunities for personal and professional growth and maintaining a culture of open communications where everyone receives constructive performance feedback and is encouraged to offer new ideas about any aspect of the work we do and our ways of doing things.

Employee Benefits. We believe in fairly and competitively rewarding our employees. As a global company, we maintain a program of benefits tailored to local market norms in each region to support employees with medical insurance, paid leave and other non-salary benefits. For example, in the U.S. and EMEA, we maintain a Real Time Rewards program to enable recognition of employee achievements and contributions. This on-line program allows anyone to nominate a co-worker for recognition. We believe this program encourages cross-functional teams, providing a way of acknowledging team members who may not be in the same employment reporting structure. In 2020, almost 1,000 Real Time Rewards were delivered to employees who received a cash benefit of between $25 and $100, or other non-monetary recognition.

Training and Development. We believe investing in our employees professional development so that they can perform their current roles more effectively and can be prepared for roles of greater responsibility in the future. Our training programs utilize a combination of in-person and online programs and include core modules, some of which are mandatory, relating to ethical conduct, products and services, safety, human rights and anti-corruption, as well as additional tailored programs on topics such as leadership, management, project management and competency development. In 2020, we delivered approximately 12 training hours per employee across our workforce.

Safety, Health and Well-being. We strive for a workplace that is free of hazards for our employees. We take care to comply with applicable safety regulations and have a strong track record for safety that we reinforce through regular training modules in all of our locations.

In 2020, as a result of the COVID-19 pandemic, we took a number of steps to help ensure the safety and well-being of our employees. This included closing our offices and shifting most employees to work from home. We instituted a phased return to occupancy plan that provides for a gradual return of employees to our locations based on the current conditions in the geographic region the office is located in, as well as local regulations. In addition, we have taken a number of steps, including increased sanitation, requiring masks and limiting the number of people allowed in common areas and conference rooms, to help further protect employees returning to the office. We have provided regular communications to our employees to update them on our policies and created a COVID-19 resource site for them that includes information and resources on working from home and links to official resources from the World Health Organization, the Centers for Disease Control and others.

In light of the restrictions on movement and new levels of stress experienced as a result of the COVID-19 pandemic, we started a “Better Together” wellness month that aimed to promote mental and physical well-being and allow employees around the world to get to know each other and have fun. This online program utilized a personal wellness coaching application that allowed for round-the-clock access for teams in all regions. The program featured live and recorded sessions on a range of topics relating to health and nutrition, work-from-home support, stress management, mindfulness and parenting during the COVID-19 pandemic. Employees can post their activities and encourage others to post their activities as well. Nearly 1,300 employees representing every region participated in the program.

Community Investment. We value the communities in which we work. We encourage a service mindset among our employees wherever they are and support community involvement and engagement. To that end, since 2010, we have provided a day of

paid time off for all employees to participate in our Global Day of Service during which they are encouraged to volunteer and contribute to local non-profits in their communities.

Measuring Employee Engagement. We believe one of the best ways to monitor our overall employee engagement is through monitoring employee turnover rates, as successful employee engagement helps increase employee tenure and reduce voluntary turnover. As of December 31, 2020, our voluntary employee turnover was approximately 6% globally, which we believe is significantly better than industry averages. Our average employee tenure is approximately 11 years and more than 41% of our employees have been with Ribbon (and our predecessor companies) for more than ten years. As a further way of measuring employee engagement, in 2020 we conducted our first employee pulse survey to better understand employee’s views on items such as our strategy, communication and whether or not they would recommend Ribbon as a place to work. More than 82% employees participated in our initial survey. We intend to use the results from this and future surveys to look for ways to continually improve our employee engagement.

Corporate Governance and Social Responsibility

We are committed to operating ethically, efficiently and inclusively. We believe we contribute to the communities in which we operate through the mitigation of climate change and other global sustainable development priorities. We aim to help improve the quality of the lives of people, society and the health of the planet through leveraging our expertise in transforming networks, enhancing security and delivering world-class solutions. We believe that communications technology and continuous innovation form the backbone upon which sustainable development largely depends. Major technology trends supported by our solutions include the accelerated adoption of Collaboration platforms such as Microsoft Teams and Zoom; the 5G revolution; accelerating customers' ability to transfer carbon-intensive data storage from using local physical environments to the cloud; supporting service providers’ increased network demands to allow more people to work from home; and using our analytics solutions to maximize network efficiencies.

In 2019, we published our Environmental Policy that sets forth our goals within which our global business operations to conserve natural resources and minimize negative impacts that our activities, products and services may have on the global and local environment. Pursuant to this policy, we are committed to protecting the environment and preventing pollution within a product’s lifecycle through responsible product design and requiring suppliers to adhere to sustainable practices. An example of this is our focus on continuously improving the power and space efficiency of our products to reduce overall energy consumption in our customers' networks at our own facilities. We align our compliance goals with component directives such as RoHS legislation in the European Union and China and with the European WEEE directive. We also hold a host of internationally recognized certifications for our global offerings, including ISO 9001:2015 - Quality Management Systems; ISO 14001:2015 - Environmental Management Systems; and SI 10000:2013 – Social Responsibility (covering our sites in Israel).

It has always been paramount to our way of doing business to act with the utmost integrity, honesty and transparency. Our commitment to ethical business practices guide us in our compliance with national and international laws and regulations, including anti-corruption, anti-bribery and unfair competition, antitrust and human rights. We maintain a Code of Conduct that applies to all of our directors, employees, contractors and suppliers. We are committed to strong corporate governance practices, which include building long-term value and assuring success for our stockholders and other stakeholders, including employees, customers and the communities in which we operate.

For additional information regarding our corporate governance and our social responsibility goals and initiatives, please see “Corporate Governance” on our investor relations website (investors. ribboncommunications.com) and our most recent sustainability report, which is available at ribboncommunications.com/company/company-policies/sustainability-report.

Seasonality

We have experienced quarterly fluctuations in customer activity due to seasonal considerations. We typically experience increases in order volume in the fourth quarter due to greater spending on operating and capital expenditures by our service provider customers. We typically experience reductions in order volume toward the beginning of the calendar year, when our service provider customers are operationalizing their annual budgets and plans, which may result in lower revenue in the first quarter. These typical seasonal effects may vary. Accordingly, they should not be considered a reliable indicator of our future operating results.

Additional Information

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed with or furnished to the United States Securities and Exchange Commission (the “SEC”), are available free of

charge through the SEC's Internet site (*http://www.sec.gov*) or our Internet site (*http://www.ribboncommunications.com*) as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. Information contained on, or that can be accessed through, our website does not constitute a part of this annual report and is not incorporated by reference herein.

Item 1A. Risk Factors

Our business faces significant risks and uncertainties. Certain important factors may have a material adverse effect on our business prospects, financial condition and results of operations, and they should be carefully considered. Accordingly, in evaluating our business, we encourage you to consider the following discussion of risk factors in its entirety in addition to other information contained in or incorporated by reference into this Annual Report on Form 10-K and our other public filings with the Securities and Exchange Commission ("SEC"). Other events that we do not currently anticipate or that we currently deem immaterial may also affect our business, prospects, financial condition and results of operations.

Risks Related to our Business and Industry

Our quarterly revenue and operating results are unpredictable and may fluctuate significantly from quarter to quarter, which could adversely affect our business, results of operations and the trading price of our common stock.

Our revenue and operating results may vary significantly from quarter to quarter due to a number of factors, many of which are outside of our control and any of which may cause our stock price to fluctuate. Material factors that may affect our revenue and operating results include those discussed below under "Risks Related to our Business and Industry."

Equipment purchases by CSPs and enterprises continue to be unpredictable. As with other telecommunications product suppliers, we typically recognize a portion of our revenue in a given quarter from sales booked and shipped in the last weeks of that quarter. As a result, delays in customer orders may result in delays in shipments and recognition of revenue beyond the end of a given quarter. Additionally, we rely on the revenue provided by certain large customers. It can be difficult for us to predict the timing of receipt of major customer orders, and we are unable to control their timing decisions. In the past, we have experienced significant variability in the spending patterns and purchasing practices of our large customers on a quarterly and annual basis, and we expect that this variability will continue. Consequently, our quarterly operating results are difficult to predict, even in the short term, and a delay in an anticipated sale past the end of a particular quarter may negatively impact our results of operations for that quarter, or in some cases, that year. Therefore, we believe that quarter-to-quarter comparisons of our operating results are not a good indication of our future performance. If our revenue or operating results fall below the expectations of investors or securities analysts or below any guidance we may provide to the market, the price of our common stock could decline substantially. Such a stock price decline could also occur even if we meet our publicly stated revenue and/or earnings guidance.

A significant portion of our operating expenses is fixed in the short term. If revenue for a particular quarter is below expectations, we may not be able to reduce costs and expenses proportionally for that quarter. Any such revenue shortfall would, therefore, have a significant effect on our operating results for that quarter.

The COVID-19 pandemic and resulting deterioration in global economic conditions may have a material adverse impact on our business, financial position and results of operations.

In 2020, a novel strain of the coronavirus (COVID-19) was declared by the World Health Organization to be a global pandemic. The COVID-19 pandemic has had a negative effect on the global economy, disrupting the various manufacturing, commodity and financial markets and increasing volatility, and has impeded global supply chains, including that of our recently acquired subsidiary, ECI Telecom Group Ltd. Dampened global economic conditions and higher unemployment as a result of the COVID-19 pandemic may cause our customers to restrict spending or delay purchases for an indeterminate period of time. In addition, our ability to deliver our solutions as agreed with our customers depends on the ability of our global contract manufacturers, vendors, licensors, and other business partners to deliver products or perform services we have procured from them. If the COVID-19 pandemic impairs the ability of our business partners to support us on a timely basis, or negatively impacts the demand for our customers' other products and services, our ability to perform our customer contracts as well as the demand for our solutions may suffer. In addition, disruptions from the COVID-19 pandemic has included the temporary closures of some of our facilities, as well as those of our contract manufacturers, vendors and suppliers, the inability to obtain key components of our products, the disruption of logistics necessary to import, export and deliver our solutions, limitations on the ability of our customers to perform or make timely payments, and/or workforce disruptions due to illness, quarantines, government actions, facility closures, partial work permits limiting the capacity of production facilities, or other restrictions.

Actions taken globally in response to the COVID-19 pandemic have created significant dislocation in demand and pricing for oil, which has subsequently impacted a variety of currencies around the world. These fluctuations in the relative value of currencies could have a significant impact on demand for our products and the net sales price and profitability.

The degree to which the COVID-19 pandemic ultimately impacts our business, financial position and results of operations will depend on future developments beyond our control, including the severity of the pandemic, including the frequency and duration of future waves of infection; the effectiveness and timing of any vaccines, the extent of actions to contain or treat the virus; how quickly and to what extent normal economic and operating conditions can resume; the health of and the effect on our workforce, particularly if members of our workforce are quarantined as a result of exposure, worker absenteeism as a result of illness or other factors, social distancing measures including work from home measures and other travel, health-related, business, government or other restrictions in connection with pandemics or disease outbreaks; and the severity and duration of the global economic downturn that results from the pandemic.

If we fail to compete successfully against telecommunications equipment and networking companies, our ability to increase our revenue and achieve profitability will be impaired.

Competition in the telecommunications market is intense. The market is shifting from an ecosystem dominated by a few large incumbent telecommunications equipment companies, such as Ericsson LM Telephone Company, Huawei Technologies Co. Ltd. and Nokia Corporation, to a market with competitors that are characterized by network virtualization, migration to the cloud, and open interfaces. We believe this shift creates opportunities for us, as well as our direct competitors in telecommunications and networking. The shift also creates opportunities for new entrants, including some that may currently be our strategic partners, that could become competitors in the industry. See Item 1. "*Business – Competition*". Mergers among any of these or other competitors could strengthen their ability to compete against us, and additional competitors with significant financial resources entering our markets could further intensify competition.

To compete effectively, we must deliver innovative products that provide extremely high reliability and quality; deploy and scale easily and efficiently; interoperate with existing network infrastructures and multivendor solutions; provide effective network management; are accompanied by comprehensive customer support and professional services; provide a cost-effective and space-efficient solution for enterprises and service providers; meet price competition from low cost equipment providers; and offer solutions that are timely for the market and support where the industry is heading.

Many of our current and potential competitors have significantly greater selling and marketing, technical, manufacturing, financial and other resources than we have. Further, some of our competitors sell significant amounts of other products to our current and prospective customers and have the ability to offer lower prices to win business. Our competitors' broad product portfolios, coupled with already existing relationships, may cause our customers to buy our competitors' products or harm our ability to attract new customers.

If we are unable to compete successfully against our current and future competitors, we could experience price reductions, order cancellations and loss of customers and revenue, and our operating results could be adversely affected.

Our future success is dependent on growing our base of customers and expanding our recurring revenue from our existing customers.

We rely on certain key customers, and our future success will depend on our ability to generate recurring business from our existing customers and to attract additional customers beyond our current customer base. One customer, Verizon Communications Inc., contributed approximately 15% of our revenue in the year ended December 31, 2020. Our top five customers contributed approximately 34% of our revenue in 2020. Factors that may affect our ability to grow our customer base include, but are not limited to, economic conditions that discourage potential new customers from making the capital investments required to adopt new technologies; deterioration in the general financial condition of service providers and enterprises, or their ability to raise capital or access lending sources; new product introductions by our competitors; and the success of our channel partner program. If we are unable to expand our customer base, the loss of any significant customer, or any substantial reduction in purchase orders or deferral of purchasing decisions from these customers, could materially adversely affect our results of operations and financial condition.

Consolidation in the telecommunications industry could harm our business.

The telecommunications industry, including many of our customers, has experienced consolidation, including, in the carrier space, the merger between T-Mobile US, Inc. and Sprint Corporation (April 2020) and the acquisition of Blue Face Ltd. by Comcast Corporation (January 2020). Further, consolidation has also occurred in the telecommunications supplier and vendor space, including the proposed acquisition of Acacia Communications, Inc. by Cisco Systems, Inc. (closing expected in the first quarter of 2021) and the closing of a strategic partnership between RingCentral, Inc. and Avaya Holdings Corp. (October 2019).

We expect this trend to continue. Consolidation among our customers may cause delays or reductions in capital expenditure plans by such customers and/or increased competitive pricing pressures as the number of available customers declines and the relative bargaining power of customers increases in relation to suppliers. Any of these factors could materially adversely affect our business.

Restructuring activities could adversely affect our ability to execute our business strategy.

We recorded net restructuring expense of $16.2 million in 2020, comprised of $12.0 million for severance and related costs and $4.2 million related to facilities, including $0.6 million for accelerated amortization of lease assets. We may record additional restructuring expense in 2021 or in the future in connection with new restructuring initiatives, if any.

Our current restructuring and any future restructuring, should it become necessary for us to further restructure our business due to market conditions or other factors that reduce the demand for our products and services, could adversely affect our ability to execute our business strategy in a number of ways, including through loss of key employees; diversion of management's attention from normal daily operations of the business; diminished ability to respond to customer requirements related to both products and services; disruption of our engineering and manufacturing processes, which could adversely affect our ability to introduce new products and to deliver products both on a timely basis and in accordance with the highest quality standards; and/or reduced ability to execute effectively internal administrative processes, including the implementation of key information technology programs.

There can be no assurance that any restructuring actions we have taken in the past, or may take in the future, will improve our financial condition or results of operations.

We are exposed to the credit risk of some of our customers and to credit exposures in fragile financial markets, which could result in material losses.

Due to our reliance on significant customers, we are dependent on the continued financial strength of our customers. If one or more of our significant customers experience financial difficulties, it could result in uncollectable accounts receivable and our loss of significant customers and anticipated revenue.

Most of our sales are on an open credit basis, with typical payment terms of 30 to 90 days. In our IP Optical Networks segment, some payment terms may be as long as 180 days or, in limited circumstances, even longer. We evaluate and monitor individual customer payment capability in granting such open credit arrangements and maintain reserves that we believe are adequate to cover exposure for doubtful accounts. However, there can be no assurance that our open credit customers will pay the amounts they owe us or that the reserves we maintain will be adequate to cover such credit exposure. Our sales derived through distributors, in particular, represent sources of increased credit risk as distributors tend to have more limited financial resources than other resellers and end-user customers.

Our customers' failure to pay and/or our failure to maintain sufficient reserves could have a material adverse effect on our results of operations and financial condition. Additionally, in the event that turmoil in the credit markets makes it more difficult for some customers to obtain financing, those customers' ability to pay could be adversely impacted, which in turn could have a material adverse impact on our business, results of operations and financial condition.

Disruptions to, or our failure to effectively develop relationships with and manage, distributors, resellers, system integrators and other channel partners, and the processes and procedures that support them, could adversely affect our ability to generate revenue from the sale of our products and services.

We continue to enhance our sales strategy, which we expect will include more partner sales engagements to resell our products and services through authorized distributors, value-added resellers ("VARs"), system integrators and other channel partners. Our future success is dependent upon establishing and maintaining successful relationships with a variety of distributors, VARs, system integrators and other channel partners. We may also need to pursue strategic partnerships with vendors that have broader technology or product offerings in order to compete with end-to-end solution providers. In addition, many of the enterprise markets we are pursuing require a broad network of resale partners in order to achieve effective distribution.

Many of our distribution and channel partners sell competitive products and services, and the loss of, or reduction in sales by, these partners could materially reduce our revenue. Our sales through channel partners typically involve the use of our products as components of a larger solution being implemented by systems integrators. In these instances, the purchase and sale of our products are dependent on the channel partners, who typically control the timing, prioritization and implementation of projects. If we fail to maintain relationships with our distribution, VAR and systems integration partners, fail to develop new relationships with other partners in new markets, fail to manage, train or provide incentives to our existing partners effectively,

or if these partners are not successful in their sales efforts, sales of our products and services may decrease and our operating results could suffer. Moreover, if we do not have adequate personnel, experience and resources to manage the relationships with our partners and to fulfill our responsibilities under such arrangements, any such shortcomings could have a material adverse impact on our business and results of operations.

If our strategic plan, including our research and development of innovative new products and the improvement of existing products, is not aligned with our customers’ investments in the evolution of their networks, or if our products and services do not meet customers’ demands, customers may not buy our products or use our services.

We spend a significant amount of time, money and resources both developing new technology, products and solutions and acquiring new businesses or business assets to help keep up with rapid technology and market changes. Our strategic plan includes a continued shift in our investments from mature technologies that previously generated significant revenue for us toward certain next-generation technologies. Our choices of specific technologies to pursue, and those to de-emphasize, may prove to be inconsistent with our customers' investment spending. Moreover, if we invest in the development of technologies, products and solutions that do not function as expected, are not adopted by the industry, are not ready in time, are not accepted by our customers as quickly as anticipated or at all, mature more quickly than we anticipated or are not successful in the marketplace, our sales and earnings may suffer and, as a result, our stock price could decline.

To achieve market acceptance for our products, we must effectively anticipate, and adapt in a timely manner to, customer requirements and offer products and services that meet changing customer demands. Prospective customers may require product features and capabilities that our current products do not have. The introduction of new or enhanced products also requires that we carefully manage the transition from older products in order to minimize disruption in customer ordering patterns and ensure that adequate supplies of new products can be delivered to meet anticipated customer demand. If we fail to develop products and offer services that satisfy customer requirements or if we fail to effectively manage the transition from older products, our ability to create or increase demand for our products and services could be seriously harmed, we may lose current and prospective customers and our results of operations and financial condition could be materially adversely affected.

If our products do not interoperate with our customers' existing networks, we may not retain current customers or attract new customers.

Many of our customers will require that our products be designed to interface with their existing networks, each of which may have different specifications. Issues caused by an unanticipated lack of interoperability may result in significant warranty, support and repair costs, divert the attention of our engineering personnel from our appliance and software development efforts and cause significant customer relations problems. If our products do not interoperate with those of our customers' networks, installations could be delayed or orders for our products could be canceled, which would seriously harm our gross margins and result in loss of revenue or customers.

We believe the telecommunications industry is in the early stages of a major architectural shift to the virtualization of networks. If the architectural shift does not occur, if it does not occur at the pace we predict, or if the products and services we have developed are not attractive to our customers after such shift takes place, our revenue could decline.

We believe the telecommunications industry remains in the early stages of transitioning to the virtualization of networks. While we anticipate that the industry shift to a software-centric cloud-based architecture is likely to happen, fundamental changes like this often take time to accelerate. In addition, our customers may adapt to such changes at varying rates. As our customers take time to determine their future network architectures, we may encounter delayed timing of orders, deferred purchasing decisions and reduced expenditures by our customers. These longer decision cycles and reduced expenditures may negatively impact our revenue or make it difficult for us to accurately predict our revenue, either of which could materially adversely affect our results of operations and cause our stock price to decline.

Virtualization of our product portfolio to increasingly focus on software-based products could also adversely impact our revenue growth. As we virtualize our product portfolio, we expect our margins to improve due to decreased costs tied to production and sales of our appliance products, however, our revenue may decline as a result of the decreases in sales of appliance products, many of which have generated higher revenue on a per-unit basis than certain of our software products.

The market for some of our products depends on the availability and demand for other vendors' products.

Some of our products, particularly those addressing the Unified Communications market, are designed to function with other vendors' products. In these cases, demand for our products is dependent upon the availability, demand for, and sales of the other vendors' products, as well as the degree to which our products successfully interoperate with the other vendors' products and add value to the solution being provided to the customer. If the other vendors change the design of their products, delay the issuance of new releases, fail to adequately market their products, or are otherwise unsuccessful in building a market for their

products, the demand for our products will be adversely affected, which could adversely affect our business, results of operations and financial condition.

Failure by our strategic partners or by us in integrating products provided by our strategic partners could harm our business.

Our solutions include the integration of products supplied by strategic partners, who offer complementary products and services. We rely on these strategic partners in the timely and successful deployment of our solutions to our customers. If the products provided by these partners have defects or do not operate as expected, if the services provided by these partners are not completed in a timely manner, if our partners have organizational or supply issues, or if we do not effectively integrate and support products supplied by these strategic partners, then we may have difficulty with the deployment of our solutions that may result in loss of, or delay in, revenue; increased service, support and warranty costs and a diversion of development resources; and/or network performance penalties.

In addition to cooperating with our strategic partners, such as Microsoft, on specific customer projects, we also may compete in some areas with these same partners. If these strategic partners fail to perform or choose not to cooperate with us on certain projects, in addition to the effects described above, we could experience loss of customers and market share, or fail to attract new customers.

If our contract manufacturers fail to perform, or if we change or consolidate manufacturers, we may fail to meet the demands of our customers and damage our customer relationships, which could materially adversely affect our business.

We currently rely on two large global contract manufacturers to assemble our products according to our specifications and to fulfill orders on a timely basis. Reliance on a third-party manufacturer involves a number of risks, including a lack of control over the manufacturing process, inventory management and the potential absence or unavailability of adequate capacity. As we do not have the internal manufacturing capabilities, any difficulties or failures to perform by our contract manufacturers could cause delays in customer product shipments, which could negatively affect our relationships with customers and result in delayed revenue.

In addition, any future changes to or consolidations of our current contract manufacturers could lead to material shortages or delays in the supply of our products. Qualifying a new contract manufacturer to commence commercial scale production or consolidating to a reduced number of contract manufacturers are expensive and time-consuming activities and could result in a significant delay in the supply of our products, which could negatively affect our relationships with customers and result in delayed revenue.

We and our contract manufacturers rely on single or limited sources for supply of some components of our products and if we fail to adequately predict our manufacturing requirements or if our supply of any of these components is disrupted, we will be unable to ship our products in a timely manner, or at all.

We and our contract manufacturers currently purchase several key components of our products. Depending upon the component, there may or may not be alternative sources of substitutes. If we overestimate our component and finished goods requirements, we could have excess inventory, which would increase our costs. If we underestimate our requirements, we may not have an adequate supply, which could interrupt manufacturing of our products and result in delays in shipments and revenue. Additionally, if any of our contract manufacturers underestimates our requirements, it may not have an adequate supply, which could interrupt manufacturing of our products and result in delays in shipments and revenue. If any of our sole or limited source suppliers experiences capacity constraints, work stoppages or other reductions or disruptions in output, it may not be able to meet, or may choose not to meet, our delivery schedules. Moreover, we have agreed to compensate our contract manufacturers in the event of termination or cancellation of orders, discontinuance of product or excess material.

We currently do not have long-term supply contracts with our component suppliers and they are not required to supply us with components for any specified periods, in any specified quantities or at any set price, except as may be specified in a particular purchase order. In the event of a disruption or delay in supply or our inability to obtain components, we may not be able to develop an alternate source in a timely manner or at favorable prices, or at all. While we regularly monitor our inventory of supplies, a failure to find acceptable alternative sources could hurt our ability to deliver high-quality products to our customers and negatively affect our operating margins.

Reliance on our suppliers also exposes us to potential quality variations and unforeseen price increases. Any disruption in the supply of key components would seriously adversely affect our ability to meet committed delivery dates and could result in loss of customers, harm to our ability to attract new customers, or legal action. Additionally, any unforeseen increases in the prices of components could reduce our profitability or force us to increase our prices, which could result in a loss of customers or harm our ability to attract new customers and could have a material adverse effect on our results of operations.

Our customer contracts also generally allow customers to reschedule delivery dates or cancel orders within certain time frames before shipment without penalty and outside those times frames with a penalty. Because of these and other factors, there are risks of excess or inadequate inventory that could negatively affect our expenses and results of operations.

If we are unable to correctly estimate future requirements for appliance products that we purchase from our third-party vendors have reached the end of their life cycles, it could harm our operating results or business.

Some of the appliance products that we purchase from our third-party vendors have reached the end of their life cycles. It may be difficult for us to maintain appropriate levels of the discontinued appliances to adequately ensure that we do not have a shortage or surplus of inventory of these products. If we do not correctly forecast the demand for such appliances, we could have excess inventory and may need to write off the costs related to such purchases and such write-offs could materially adversely affect our operating results. However, if we underestimate our forecast and our customers place orders to purchase more products than are available, we may not have sufficient inventory to support their needs. If we are unable to provide our customers with enough of these products, it could make it difficult to retain certain customers, which could have a material and adverse effect on our business.

Our products may have errors or defects that we find only after full deployment.

Our larger scale products are sophisticated and are designed to be deployed in large and complex networks around the world. Because of the nature of our products, they can only be fully tested when substantially deployed in these networks. Some of our customers may discover errors or defects in the software or appliances, or the products may not operate as expected only after full deployment. Our customers expect us to establish a support infrastructure and maintain demanding support standards to ensure that their networks maintain high levels of availability and performance. As we continue to expand our distribution channel through distributors and resellers, we will need to rely on and support their service and support organizations. If we, or our distributors and resellers, are unable to fix errors or other performance problems that may be identified after full deployment of our products, or provide the expected level of support and service to our customers, we could experience increased service, support and warranty costs and a diversion of development resources, loss of customers, network performance penalties and/or legal actions by our customers, which could materially adversely affect our business and results of operations.

Disruptions to, or our failure to effectively develop, manage and maintain our government customer relationships could adversely affect our ability to generate revenue from these customers. Further, such government sales are subject to potential delays and cutbacks, may require specific testing efforts, or impose significant compliance obligations.

A portion of our total revenue from product sales comes from contracts with U.S. federal government agencies and other foreign countries. Disruptions to or our failure to effectively develop, manage and maintain our government customer relationships could adversely affect our ability to generate revenue from the sales to such customers. Governments routinely investigate and audit government contractors' administrative processes, and any unfavorable audit could result in the government refusing to continue buying our products and services, a reduction of revenue or fines or civil or criminal liability if the audit uncovers improper or illegal activities, which could materially adversely impact our operating results.

Factors that could impact federal government spending on our products and services include a significant decline in, or reapportioning of, spending by the federal government, changes as a result of the current presidential administration, changes, delays or cancellations of federal government programs or requirements, the adoption of new laws or regulations, federal government shutdowns or other delays in the government appropriations process, changes in the political climate and general economic conditions. The loss or significant curtailment of any government contracts or subcontracts, whether due to our performance or due to interruptions or changes in governmental funding, could have a material adverse effect on our business, results of operations and financial condition.

Further, sales to government customers may require specific testing efforts or impose significant compliance or certification obligations. For example, the Department of Defense ("DOD") has issued specific requirements for IP networking products for features and interoperability. In order for our products to be used to connect to the DOD network, that product must pass a series of significant tests and be certified by the Joint Interoperability Test Command ("JITC"). While certain of our products are certified by JITC, if we are unable to obtain future JITC certification as needed, our DOD sales and results of operations, may suffer.

Combining ECI, or future companies, may be more difficult, costly or time-consuming than expected and the anticipated benefits and cost savings of the ECI Acquisition, or future mergers may not be realized.

We have a history of significant mergers and acquisitions, including, most recently, the ECI Acquisition. The success of the ECI Acquisition, and any future merger or acquisition, including anticipated benefits and cost savings, will depend, in part, on our ability to successfully combine and integrate the businesses. It is possible that the integration process could result in the loss of key employees, higher than expected costs, diversion of management attention, the disruption of our ongoing businesses or inconsistencies in standards, controls, procedures and policies that adversely affect the combined company's ability to maintain relationships with customers, vendors and employees or to achieve the anticipated benefits and cost savings of the ECI Acquisition or any future merger or acquisition.

We have incurred and will incur additional transaction fees, including legal, regulatory and other costs associated with closing the ECI Acquisition as well as expenses relating to formulating and implementing integration plans, including facilities and systems consolidation costs and employment-related costs. We continue to assess the magnitude of these costs, and additional unanticipated costs may be incurred in the ECI Acquisition and the integration of the two companies' businesses, or in future acquisitions. While we expect that the elimination of duplicative costs as well as the realization of other efficiencies related to the integration of the businesses should allow us to offset integration-related costs over time, this net benefit may not be achieved in the near term or at all. As part of the integration process, we may also attempt to divest certain assets of the combined company, which may not be possible on favorable terms, or at all, or if successful, may change the profile of the combined company. If we experience difficulties with the integration process, the anticipated benefits of the ECI Acquisition, or any future acquisition, may not be realized fully or at all, or may take longer to realize than anticipated. The actual cost savings of the ECI Acquisition could also be less than expected.

Any future investments, mergers or acquisitions we make or enter into, as applicable, could be difficult to integrate, disrupt our business, dilute shareholder value and seriously harm our financial condition.

We have a history of significant acquisitions, including the recent ECI Acquisition, and we may merge with or acquire additional businesses, products or technologies in the future. No assurance can be given that any future merger or acquisition will be successful or will not materially adversely affect our business, operating results or financial condition. We continue to review opportunities to merge with or acquire other businesses or technologies that would add to our existing product line, complement and enhance our current products, expand the breadth of our product and service offerings, enhance our technical capabilities or otherwise offer growth opportunities. If we enter into a merger or make acquisitions in the future, we could, among other things issue stock that would dilute existing stockholders' percentage ownership; incur significant debt or assume significant liabilities; materially reduce our cash; incur significant amortization expenses related to intangible assets; and/or incur large and immediate write-offs for in-process research and development and stock-based compensation.

Mergers and acquisitions are inherently risky and subject to many factors outside of our control. Therefore, we cannot be certain that we would be successful in overcoming problems in connection with our past or future acquisitions. Our inability to do so could significantly harm our business, revenue, and results of operations.

Failure to hire and retain key personnel, or the loss of any of our executive officers, could negatively impact our ability to meet our business objectives and impair our future growth.

Our business depends upon highly skilled technical, managerial, engineering, sales, marketing and customer support personnel. Competition for these personnel is intense, especially during times of economic recovery or growth. Any failure to hire, assimilate in a timely manner and retain key qualified personnel, particularly engineering and sales personnel, could impair our growth and make it difficult to meet key objectives, such as timely and effective product introductions. In addition, our ability to attract and retain key employees could be adversely impacted if we do not have a sufficient number of shares available under the Amended and Restated 2019 Stock Incentive Plan to issue to our employees. We may not be able to locate suitable employees for any key employee who leaves or offer employment to potential replacements on reasonable terms.

Our future success also depends upon the continued services of our executive officers who have critical industry experience and relationships that we rely on to implement our business plan. None of our officers or key employees is bound by an employment agreement for any specific term. The loss of the services of any of our executive officers or key employees could delay the development and introduction of, and negatively impact our ability to sell, our products and achieve our business objectives.

Man-made problems, such as terrorism, and natural catastrophic events may disrupt our operations and harm our operating results.

The continued threat of terrorism and heightened security and military action in response to this threat, or any future acts of terrorism, may cause disruptions to the economies of the United States and other countries. Events such as work stoppages or widespread blackouts could have similar negative impacts. Such disruptions or uncertainties could result in delays or

cancellations of customer orders or the manufacture or shipment of our products and have a material adverse effect on our business and results of operations.

Natural catastrophic events, such as earthquakes, fires, floods, tornadoes, or pandemics (such as the COVID-19 pandemic) may also affect our or our customers' operations. For example, we have offices located in the San Jose area of Northern California; Mexico City, Mexico; and Tokyo, Japan, regions known for seismic activity. A significant natural disaster, such as wildfires, earthquakes or floods, could have a material adverse effect on our business in these locations.

Risks Related to our International Operations

Worldwide efforts to contain capital spending and global economic conditions and uncertainties in the geopolitical environment have been and may continue to be materially adverse to our business.

A factor that significantly affects our operating results is the impact of economic conditions on the willingness of our current and potential customers to make capital investments. Given the general uncertainty regarding global economic conditions and other factors, we believe that customers have tried to maintain or improve profitability through cost control and constrained capital spending, which places additional pressure on IT departments to demonstrate acceptable return on investment. Some of our customers have canceled or delayed, and current and prospective customers may continue to cancel and delay, spending on the development or roll-out of capital and technology projects with us due to economic uncertainty and, consequently, our results of operations have been, and may continue to be, adversely affected. In addition, current uncertain worldwide economic and political environments make it increasingly difficult for us, our customers and our suppliers to accurately forecast future product demand, which could result in an inability to satisfy demand for our products and a loss of market share. Our revenue is likely to decline in such circumstances, which may result in erosion of our profit margins and significant losses.

Moreover, economic conditions worldwide may contribute to slowdowns in the communications and networking industries, as well as to specific segments and markets in which we operate, particularly the wireline sector, resulting in, among other things, reduced demand for our products and services as a result of our customers choosing to refrain from building capital intensive networks; increased price competition for our products, not only from our competitors, but also as a consequence of customers disposing of unutilized products; and risk of excess and obsolete inventories. Continuing turmoil in the geopolitical environment in many parts of the world may continue to put pressure on global economic conditions which in turn, could materially adversely affect our operating results. For example, following recent border clashes with China, India has enacted bans on the import of some goods manufactured in China. While the current import bans do not include our products, if India expands the bans to include the products we sell in India that are currently manufactured in China, we may be required to find new manufacturing locations for such products. While we have developed plans to relocate our manufacturing sites if needed, the timing required for relocation, or if we are not successful in relocating, could impact our ability to sell such products or timely deliver the products, and could result in lower or lost sales in India. The need to move manufacturing of such products could also negatively impact the margin earned on the sale of such products.

Conditions in Israel may materially and adversely affect the Company's business.

Following the ECI Acquisition, we have a significant number of employees located in Israel. As a result, political, economic and military conditions in Israel may directly affect the Company's business. In recent years, there have been hostilities between Israel and Hezbollah in Lebanon and Hamas in the Gaza Strip, both of which resulted in rockets being fired into Israel, causing casualties and disruption of economic activities. Popular uprisings in various countries in the Middle East and North Africa over the last few years has also affected the political stability of those countries and have led to a decline in the regional security situation. Such instability may also lead to deterioration in the political and trade relationships that exist between Israel and these countries. Any armed conflicts, terrorist activities or political instability involving Israel or other countries in the region could adversely affect the Company's business, results of operations, financial condition, cash flows and prospects. Although the Israeli Government currently covers the reinstatement value of direct damages that are caused by terrorist attacks or acts of war, the Company cannot ensure shareholders that this coverage will be maintained or will be adequate in the event the Company submits a claim.

A number of countries, principally in the Middle East, still restrict doing business with Israel and Israeli companies, and additional countries may impose restrictions on doing business with Israel and Israeli companies if hostilities in Israel or political instability in the region continue or increase. In addition, there have been increased efforts by activists to cause companies and consumers to boycott Israeli goods based on Israeli Government policies. Such actions, particularly if they become more widespread, may adversely impact the Company's ability to sell its products.

The Company's operations could also be disrupted by the absence for significant periods of one or more of its key employees or a significant number of other employees because of military service. Some of the Company's employees in Israel are obliged to perform military reserve duty, which generally accumulates over a period of three years from several days to up to a

maximum of 84 days (and up to 108 days, in special circumstances specified under applicable law) and, in certain emergency circumstances, employees may be called to immediate and unlimited active duty. In response to increases in terrorist activity, there have been periods of significant call-ups of military reservists and it is possible that there will be similar large-scale military reserve duty call-ups in the future. Any of these circumstances could have a material adverse effect on the Company’s business, results of operations, financial condition, cash flows and prospects.

The Assessment of Adjusted Gross Revenue payments in India could have a material adverse effect on our sales in India.

A dispute between large telecommunications service providers and the Indian Department of Telecommunications ("DoT") regarding how to compute the Adjusted Gross Revenue (“AGR”) due from large telecommunications service providers was recently resolved by the Supreme Court of India. The Supreme Court of India recently issued a judgment accepting the position of the DoT, requiring private telecommunications service providers to pay out higher sums towards license fee and spectrum usage fee, plus interest and penalties, which are dependent on the value of their AGR. The sums that the telecommunications service providers owe the Indian government include substantial back charges, interest and penalties, which service providers have ten years to pay, with the first 10% due March 31, 2021. The telecommunications service providers are still assessing the impact of this decision. Given the large amounts owed, it is possible that the required payments may delay, or potentially could significantly reduce, the telecommunications' service providers' capital investments in India which could have a material adverse effect on our sales in India.

We may face risks associated with our international operations that could impair our ability to grow our international revenue.

We have expanded, and expect to continue to expand, our operations in international and emerging markets. International operations are a significant part of our business, accounting for approximately 55% of total revenues in 2020. We expect such operations to continue to require significant management attention and financial resources to successfully grow. In addition, our international operations are subject to other inherent risks, including:

- greater reliance on channel partners;
- difficulties collecting accounts receivable and longer collection cycles;
- difficulties and costs of staffing and managing international operations;
- impacts of differing technical standards;
- compliance with international trade, customs and export control regulations;
- foreign government regulations limiting or prohibiting potential sales or increasing the cost of doing business in such markets, including adverse tax policies, tariffs, customs regulations, trade protection measures, export quotas and qualifications to transact business;
- foreign currency exchange controls, restrictions on repatriation of cash and changes in currency exchange rates;
- any need to adapt and localize our products for specific countries;
- our ability to effectively price our products in competitive international markets; and
- political, social and economic instability, including as a result of the fragility of global financial markets, health pandemics or epidemics and/or acts of war or terrorism.

Our international revenue, both as a percentage of total revenue and absolute dollars, may vary from one period to the next, and accordingly, current data may not be indicative of future periods. If we are unable to support our business operations in international and emerging markets, or their further expansion, while balancing the higher operational and financial risks associated with these markets, our business and results of operations could be harmed.

In addition, we may not be able to develop international market demand for our products, which could impair our ability to grow our revenue. In many international markets, long-standing relationships between potential customers and their local suppliers and protective regulations, including local content requirements and approvals, create barriers to entry. We have limited experience marketing, distributing and supporting our products in certain international locations and, to do so, we expect that we will need to develop versions of our products that comply with local standards. Moreover, difficulties in foreign financial markets and economies and of foreign financial institutions, particularly in emerging markets, could adversely affect demand from customers in the affected countries.

Increases in tariffs, trade restrictions or taxes on our products, as well as other risks of international operations, could have an adverse impact on our operations.

We manufacture certain of our appliance products and purchase a portion of our raw materials and components from suppliers in Mexico, China and other foreign countries. The commerce we conduct in the international marketplace makes us subject to tariffs, trade restrictions and other taxes when the raw materials or components we purchase, and the products we ship, cross international borders. Import tariffs and/or other mandates recently imposed by the United States have and could in the future

lead to retaliatory actions by affected countries, including China, resulting in "trade wars," and could significantly increase the prices on raw materials, the manufacturing of our equipment, and/or increased costs for goods imported into the United States, all of which are critical to our business. While we have developed plans to adjust manufacturing locations, if necessary, to avoid tariffs or other restrictions, any such tariffs could reduce customer demand for our products if our customers have to pay increased prices for our products as a result of such tariffs. In addition, tariff increases may have a similar impact on other suppliers and certain other customers, which could increase the negative impact on our operating results or future cash flows.

We are exposed to fluctuations in currency exchange rates that could negatively impact our financial results and cash flows.

Because a portion of our business is conducted outside the United States, we face exposure to adverse movements in foreign currency exchange rates. These exposures may change over time as business practices evolve, and they could have a material adverse impact on our financial results and cash flows. An increase in the value of the U.S. dollar could increase the real cost to our customers of our products in those markets outside the United States where we often sell in dollars, and a weakened U.S. dollar could increase the cost of local operating expenses and procurement of raw materials from sources outside the United States. Therefore, changes in the value of the U.S. dollar against other currencies will affect our revenue, income from operations, net income and the value of balance sheet items originally denominated in other currencies. There is no guarantee that our financial results will not be adversely affected by currency exchange rate fluctuations.

Our use and reliance upon research and development resources in global locations may expose us to unanticipated costs and/or liabilities.

We have research and development offices in various global locations, including the United States, Canada, India and China. Our development efforts and other operations in these locations could involve significant risks, including, among others, difficulty hiring and retaining appropriate engineering and management resources due to intense competition for such resources and resulting wage inflation; knowledge transfer related to our technology and resulting exposure to misappropriation of intellectual property or information that is proprietary to us, our customers and other third parties; and heightened exposure to changes in economic, security and global political conditions.

Difficulties resulting from the factors noted above and other risks related to our global operations could increase our expenses, impair our development efforts, harm our competitive position and damage our reputation.

Risks Related to Intellectual Property

Our business could be jeopardized if we are unable to protect our intellectual property. Additionally, in some jurisdictions, our rights may not be as strong as those we currently enjoy in the United States.

We rely on a combination of security countermeasures within our deployed products, as well as patent, copyright, trademark and trade secret laws and contractual restrictions on disclosure to protect our intellectual property rights. Despite our efforts to protect our proprietary rights, unauthorized parties may attempt to copy or otherwise misappropriate our products or technology. Monitoring unauthorized use of our products is difficult and we cannot be certain that the steps we have taken will prevent unauthorized use of our technology, particularly in foreign countries where the laws may not protect our proprietary rights as fully as in the United States. The legal systems of many foreign countries do not protect or honor intellectual property rights to the same extent as the legal system of the United States. It may be very difficult, time-consuming and costly for us to attempt to enforce our intellectual property rights, especially in these foreign jurisdictions. If competitors are able to use our technology, our ability to compete effectively could be harmed, which could have a material adverse effect on our business.

If we are unable to obtain necessary licenses or on-going maintenance and support of third-party technology at acceptable prices, on acceptable terms, or at all, it could harm our operating results or business.

We have incorporated third-party licensed technology, including open source software, into our current products. From time to time, we may be required to license additional technology from third parties to develop new products or product enhancements. Third-party licenses and on-going maintenance and support may not be available or continue to be available to us on commercially reasonable terms or may be available to us but only at significantly escalated pricing. Additionally, we may not be able to replace the functionality provided by third-party software currently offered with our products if that software becomes obsolete, defective or incompatible with future versions of our products or is not adequately maintained or updated. If we are unable to maintain or re-license any third-party licenses required in our current products or obtain any new third-party licenses to develop new products and product enhancements, or in the case of any defects in these third-party software products, we could be required to obtain substitute technology of lower quality or performance standards or at greater cost, and we may be delayed or prevented from making these products or enhancements, any of which could seriously harm our sales and the competitiveness of our products unless and until we can secure an alternative source.

A breach of the security of our information systems or those of our third-party providers could adversely affect our operating results.

We rely upon our information systems and, in certain circumstances, those of our third-party providers, such as vendors, consultants and contract manufacturers, to protect our sensitive or proprietary information and information of or about our customers, to develop and provide our products and services to customers, and to otherwise operate our business. Our information systems and those of our third-party providers are vulnerable to threats such as computer hacking, cyber-terrorism or other unauthorized activity that may result in third party access to or modification, corruption or deletion of our or our customers' sensitive or proprietary information or other disruptions to our business. Such cyberattacks and other cyber incidents are occurring more frequently, are constantly evolving, are becoming more sophisticated and can take many forms. For example, we are aware of a third party gaining unauthorized access to a portion of our network in the first quarter of 2021, although we do not believe they were able to obtain any material internal or customer data or otherwise disrupt our information systems before the intrusion was detected and remediated. While we believe that we leverage appropriate detection and prevention systems and services and that we focus on continuous improvement based upon the latest attack vectors in the industry, we cannot guarantee that there will never be any information technology system failures, including future breaches of our or our third-party providers' data security measures through a cyberattack, other cyber incident or otherwise, or the theft or loss of laptops, other mobile devices or electronic records used to back up our systems or our third-party providers' systems, which could result in a disclosure of customer, employee, or our information or otherwise disrupt our ability to function in the normal course of business by potentially causing, among other things, delays in the fulfillment or cancellation of customer orders or disruptions in the manufacture or shipment of products or delivery of services, any of which could have a material adverse effect on our operating results.

Additionally, the compromise of our information systems, or the information systems of our third party providers and our customers, could lead to unauthorized tampering with our products. Unauthorized tampering may result in, among other things, the disruption of our customers' businesses, errors or defects occurring in the software due to such unauthorized tampering, and our products not operating as expected after such unauthorized tampering. These types of security breaches could also create exposure to lawsuits, regulatory investigations, and increased legal liability. As a provider of secure real-time communications solutions, the reputational harm of any actual or perceived breach, compromise, defect or error relating to the security of our information systems and the products and services we provide may result in substantial harm to our reputation, even if the legal or regulatory impact is minimal. In addition, the costs to remediate any cyberattack could be significant. Such consequences could be exacerbated if we or our third-party providers are unable to adequately recover critical systems in a timely manner following a systems failure. Our insurance coverage may be insufficient to cover all losses related to cyberattacks.

Risks Related to Regulation

Risks associated with data privacy issues, including evolving laws, regulations and associated compliance efforts, may adversely impact our business and financial results.

Legislation in various countries around the world with regard to cybersecurity, privacy and data protection is rapidly expanding and creating a complex compliance environment. We are subject to many privacy and data protection laws and regulations in the U.S. and around the world, some of which place restrictions on our ability to process personal data across our business. In particular, the General Data Protection Regulation (the "GDPR"), which became effective in May 2018, has caused more stringent data protection requirements in the European Union. The GDPR imposes onerous accountability obligations requiring data controllers and processors to maintain a record of their data processing and implement policies as part of its mandated privacy governance framework. It also requires data controllers to be transparent and disclose to data subjects how their personal information is to be used; imposes limitations on retention of personal data; introduces mandatory data breach notification requirements; and sets higher standards for data controllers to demonstrate that they have obtained valid consent for certain data processing activities. We are subject to the supervision of local data protection authorities in those E.U. jurisdictions where we are established or otherwise subject to the GDPR. Certain breaches of the GDPR requirements could result in substantial fines. In addition to the foregoing, a breach of the GDPR could result in regulatory investigations, reputational damage, orders to cease/change our use of data, enforcement notices, as well potential civil claims including class action type litigation where individuals suffered harm.

Similarly, California has enacted the California Consumer Privacy Act, or CCPA, which took effect on January 1, 2020. The CCPA creates individual privacy rights for California consumers and increases the privacy and security obligations of entities handling certain personal data. The CCPA provides for civil penalties for violations, as well as a private right of action for data breaches that is expected to increase data breach litigation. The CCPA may increase our compliance costs and potential liability. Many similar laws have been proposed at the federal level and in other states. Any liability from our failure to comply with the requirements of these laws could adversely affect our financial condition.

We have invested, and continue to invest, human and technology resources in our GDPR compliance efforts and our data privacy compliance efforts in general. These compliance efforts may be time-intensive and costly. Despite those efforts, there is a risk that we may be subject to fines and penalties, litigation and reputational harm if we fail to protect the privacy of third party data or comply with the GDPR or other applicable regimes.

Failure to comply with the Foreign Corrupt Practices Act or the U.K. Bribery Act could subject us to significant civil or criminal penalties.

We earn a significant portion of our total revenue from international sales generated through our foreign direct and indirect operations. As a result, we are subject to the FCPA, and the U.K. Bribery Act of 2010 (the "UKBA"), which prohibit bribery in the conduct of business. The FCPA generally prohibits U.S. companies and their intermediaries from making corrupt payments to foreign officials for the purpose of obtaining or keeping business or otherwise obtaining favorable treatment and requires companies to maintain adequate record-keeping and internal accounting practices to accurately reflect the transactions of the company. The UKBA is much broader and prohibits all bribery, in both the public and private sectors. Under the FCPA and the UKBA, U.S. companies, their subsidiaries, employees, senior officers and/or directors may be held liable for actions taken by strategic or local partners or representatives. In addition, the U.S. government or the U.K. government, as applicable, may seek to hold us liable for successor liability violations committed by companies we have acquired or may in the future acquire. If we or our intermediaries fail to comply with the requirements of the FCPA and the UKBA, governmental authorities in the United States and the United Kingdom, as applicable, could seek to impose civil and/or criminal penalties, which could have a material adverse effect on our reputation, results of operations and the trading price of our common stock.

We are subject to governmental export and import controls that could subject us to liability, require a license from the U.S. government or impair our ability to compete in international markets.

Certain of our products with encryption technology are subject to export controls and may be exported only with the required level of export license or through an export license exception. Under these laws and regulations, we are responsible for obtaining all necessary licenses or other approvals, if required, for exports. If we were to fail to comply with existing or future export licensing, customs regulations, economic sanctions and other laws, we could be subject to substantial civil and criminal penalties, including fines for the Company and incarceration for responsible employees and managers, and the possible loss of export or import privileges. Similarly, various countries regulate the import of certain encryption technology and have enacted laws that could limit our ability to distribute our products or our customers' ability to implement our products in those countries.

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 export licenses can be difficult and time-consuming, and in some cases a license may not be available on a timely basis or at all. Changes in import/export regulations could also lead to delays in new product introductions or limit our ability to sell existing or future products in certain locations, which could adversely impact our business.

Export control laws and economic sanctions prohibit the shipment of certain products to embargoed or sanctioned countries, governments and persons. We cannot assure that a violation of these regulations 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.

Regulation of the telecommunications industry, or changes in governmental regulation, interpretation or legislative reform could harm our operating results and future prospects.

The telecommunications industry is highly regulated and our business and financial condition could be adversely affected by changes in the regulations relating to the telecommunications industry. Currently, there are few laws or regulations that apply directly to access to or delivery of voice services on IP networks. We could be adversely affected by regulation of IP networks and commerce in any country where we operate, including the United States. Such regulations could include matters such as voice over the Internet or using Internet protocol, encryption technology, and access charges for service providers. The adoption of such regulations could decrease demand for our products, and at the same time increase the cost of selling our products, which could have a material adverse effect on our business and results of operations.

Risks Related to Our Indebtedness and Accounting Matters

The terms of our credit agreement could adversely affect our operating flexibility and pose risks of default, which would negatively impact our liquidity and operations.

Our Senior Secured Credit Facility Credit Agreement, as amended, provides $500 million of commitments, comprised of a $325 million term A loan (the “Term A Loan”), a $75 million term B loan (the “Term B Loan”), and a $100 million revolving

facility (the “2020 Revolving Credit Facility” and, together with the Term A Loan and Term B Loan, the "2020 Credit Facility"). Terms in the 2020 Credit Facility impose limitations on our ability to, among other things, incur additional indebtedness, create liens, make acquisitions or engage in mergers, enter into transactions with affiliates, dispose of assets, make certain investments and amend or repay certain junior debt. These terms could adversely affect our operating flexibility and pose risks of default which would negatively impact our liquidity and operations. In addition, we may not be able to refinance our debt or obtain additional financing on favorable terms, or at all.

In addition, we are required to meet certain financial covenants customary for financings of this type. Our failure to comply with these covenants may result in the declaration of an event of default, which could cause us to be unable to borrow under the credit facility or result in the acceleration of the maturity of indebtedness outstanding under the 2020 Credit Facility at such time.

If we are prevented from borrowing or if we are unable to extend, renew or replace the credit facilities under the 2020 Credit Facility by the maturity dates, on favorable terms, or at all, this could have a material adverse effect on our liquidity and cause our business, operations and financial condition to suffer. In addition, we may not have sufficient funds available for repayment or we may not have the ability to borrow or obtain sufficient funds to replace the indebtedness on terms acceptable to us, or at all.

The United Kingdom's Financial Conduct Authority, which regulates the London Inter-bank Offered Rate ("LIBOR"), has announced that it intends to stop encouraging or requiring banks to submit LIBOR rates after 2021, and it is unclear if LIBOR will cease to exist or if new methods of calculating LIBOR will evolve. We have the option under the 2020 Credit Facility to determine our interest rate that includes either the LIBOR rate or the base rate. While we also have the ability under our current credit facility to switch to a new or alternative benchmark rate, if LIBOR ceases to exist or the methods of calculating LIBOR change from their current form, we may no longer have the ability to elect the LIBOR rate option under the 2020 Credit Facility, and our current or future indebtedness may be adversely affected. This could impact our interest costs and our ability to borrow additional funds under the 2020 Credit Facility.

We cannot be sure that our current cash and available borrowings under our 2020 Credit Facility will be sufficient to meet our future needs. If we are unable to generate sufficient cash flows in the future, and if availability under our current facility is not sufficient to support our operations, we may need to refinance our debt or obtain additional financing. We may not be able to refinance our debt or obtain additional financing on favorable terms or at all.

If our goodwill or intangible assets become impaired, we may be required to record a significant charge to earnings.

As of December 31, 2020, we had $416.9 million of goodwill and $417.4 million of intangible assets. Goodwill is tested annually for impairment and, along with our intangible assets, is also reviewed for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Based on the results of our 2019 annual impairment test, we determined that our carrying value for goodwill exceeded our fair value and accordingly, we recorded a goodwill impairment charge of $164.3 million, which had a material impact on both our net loss and loss per share for the year ended December 31, 2019. Factors that may be considered a change in circumstances indicating that the carrying value of our goodwill or intangible assets may not be recoverable include significant underperformance relative to plan or long-term projections, strategic changes in business strategy, significant negative industry or economic trends, significant change in circumstances relative to a large customer, significant decline in our stock price for a sustained period and decline in our market capitalization to below net book value. Any additional material impairment of goodwill or intangible assets could adversely affect our results of operations.

The value of the securities received in connection with the sale of our cloud-based enterprise communications service is volatile and quarterly fluctuations in price could significantly impact our financial results.

In connection with our sale of our cloud-based enterprise communications services business (the "Kandy Communications Business") to American Virtual Cloud Technologies Inc. (“AVCT”), we received 43,778 securities “units” from AVCT, with each unit consisting of (i) $1,000 in principal amount of AVCT’s Series A-1 convertible debentures (the “Debentures”); and (ii) one warrant to purchase 100 shares of AVCT common stock, $0.0001 par value (the “Warrants”). Since AVCT’s common stock underlying the Debentures and the Warrants is publicly traded on NASDAQ, under GAAP, we are required to value the Debentures on our balance sheet based on the trading price of the AVCT common stock and assumptions regarding the stock price volatility and risk-free interest rates. Such trading price is also used in the valuation method we use for the Warrants. We are also required under GAAP to revalue and mark-to-market the value of the Debentures and the Warrants on a quarterly basis, with any changes in value reflected on our income statement and, therefore, impacting our GAAP earnings for such period. AVCT’s stock price on NASDAQ has been volatile, with the closing price ranging from $1.54 to $11.25 during the fiscal year ended December 31, 2020. As a result, our financial statements may reflect significant swings in the value of the Debentures and Warrants held on our balance sheet, which could have a material impact on our financial results, even though such changes in value would not reflect our current operating business.

General Risk Factors

Litigation and government investigations could result in significant legal expenses and settlement payments, fines or damage awards.

From time to time, we are subject to litigation regarding intellectual property rights or other claims and have indemnification clauses in most of our customer contracts that may require us to indemnify customers against similar claims. We have also been named as a defendant in securities class action and stockholder derivative lawsuits and have also been subject to investigations by the government. We are generally obliged, to the extent permitted by law, to indemnify our current and former directors and officers who are named as defendants in these lawsuits. Defending against litigation or government investigation may require significant attention and resources of management. Regardless of the outcome, such litigation or investigation could result in significant legal expenses. At this time, it is not possible to predict the outcome of the ongoing lawsuits, including whether or not any proceedings will continue, and when or how these matters will be resolved or whether we will ultimately receive, and in what sum, amounts previously awarded as a result of these proceedings. Regardless of whether we are ultimately successful in these lawsuits, we will likely elect to continue to incur substantial legal fees in connection with these matters.

If the defenses we claim in our material litigation matters are ultimately unsuccessful, or if we are unable to achieve a favorable settlement with an adverse party or a government agency, we could be liable for large settlement payments, damage awards or fines that could have a material adverse effect on our business and results of operations.

If we fail to maintain appropriate internal controls in the future, we may not be able to report our financial results accurately, which may adversely affect our stock price and our business.

Section 404 of the Sarbanes-Oxley Act of 2002 and the related regulations require our management to report on, and our independent registered public accounting firm to attest to, the effectiveness of our internal control over financial reporting. We have committed and will be required to continue to commit significant financial and managerial resources in order to comply with these requirements.

Further, we are required to integrate ECI and other acquired businesses into our system of disclosure controls and procedures and internal control over financial reporting. As may be the case with other companies we acquire, prior to the ECI Acquisition, ECI was not required to implement or maintain the disclosure controls and procedures or internal control over financial reporting that are required of public companies. We cannot provide assurance as to the effectiveness of those integrations.

Internal control over financial reporting has inherent limitations, including human error, the possibility that controls could be circumvented or become inadequate because of changed conditions, and fraud. If we are unable to maintain effective internal controls, we may not have adequate, accurate or timely financial information, and we may be unable to meet our reporting obligations as a publicly traded company or comply with the requirements of the SEC or the Sarbanes-Oxley Act of 2002. This could result in a restatement of our financial statements, the imposition of sanctions, or investigation by regulatory authorities, and could cause investors to lose confidence in our reported financial information. Any such consequence or other negative effect of our inability to meet our reporting requirements or comply with legal and regulatory requirements, as well as any disclosure of an accounting, reporting or control issue, could adversely affect the trading price of our common stock and our business.

Our stock price has been and may continue to be volatile.

Our common stock price has experienced substantial volatility in the past and may remain volatile in the future. Volatility in our stock price can arise as a result of a number of the factors discussed in this “Risk Factors” section. During 2020, our closing stock price ranged from a high of $7.36 per share to a low of $2.03 per share. The stock market has experienced significant price and volume fluctuation with such volatility often unrelated to the operating performance of these companies. Actual or perceived divergence between our actual results and our forward-looking guidance for such results, the published expectations of investment analysts, or the expectations of the market generally, can cause significant swings in our stock price. Our stock price can also be affected by market conditions in our industry as well as announcements that we, our competitors, vendors or our customers may make. These may include announcements by us or our competitors of financial results or changes in estimated financial results, technological innovations, the gain or loss of customers, or other strategic initiatives. These and other factors affecting global economic conditions or financial markets may materially adversely affect the market price of our common stock in the future.

Furthermore, brokerage firms often do not permit stocks trading below $5.00 per share to be sold short, but often permit short-selling of shares which are traded at higher prices. As a result, to the extent our per-share trading price remains consistently above $5.00, investors may short our stock, which could increase the volatility of our stock price.

We entered into a stockholders' agreement with certain stockholders which provides such stockholders with certain rights that may differ from the rights of our other stockholders.

In connection with the ECI Acquisition, we entered into a First Amended and Restated Stockholders Agreement (the "Stockholders Agreement") with JPMC Heritage Parent LLC, Heritage PE (OEP) III, L.P. (together with JPMC, the "JPM Stockholders"), and ECI Holding (Hungary) Kft ("Swarth"). The Stockholders Agreement sets forth certain arrangements and contains various provisions relating to board size, board representation, standstill restrictions and transfer restrictions as further described therein, including the right of the JPM Stockholders and Swarth to each designate up to three directors for nomination to our nine-member board of directors, subject to the JPM Stockholders and Swarth maintaining certain levels of beneficial ownership of our common stock. Therefore, the JPM Stockholders and Swarth will be able to exert significant influence over matters requiring board approval, and our stockholders other than the JPM Stockholders and Swarth will have limited or no ability to influence the outcome of certain key transactions. The interests of the parties to the Stockholders Agreement may differ from those of other holders of our common stock.

Additionally, the Company entered into a First Amended and Restated Registration Rights Agreement with the JPM Stockholders and Swarth. The JPM Stockholders and Swarth collectively own approximately 52% of our common stock as of December 31, 2020, and may decide to sell their shares in bulk or from time to time, except as provided under the Stockholders Agreement, which timing we cannot control. The sale of shares by the JPM Stockholders and/or Swarth may increase the volatility of our stock price, and our stock price could decline as a result.

Delaware law and our charter documents contain provisions that could discourage or prevent a potential takeover, even if such a transaction would be beneficial to our stockholders.

Some provisions in our amended and restated certificate of incorporation, our amended and restated by-laws, as well as provisions of Delaware law, may discourage, delay or prevent a merger or acquisition that may be deemed undesirable by our Board of Directors but that a stockholder may consider favorable. These include provisions, among others,

- authorizing the Board of Directors to issue shares of preferred stock;
- limiting the persons who may call special meetings of stockholders;
- prohibiting stockholder actions by written consent;
- permitting the Board of Directors to increase the size of the Board and to fill vacancies;
- requiring a super-majority vote of our stockholders to amend our amended and restated by-laws and certain provisions of our amended and restated certificate of incorporation; and
- establishing advance notice requirements for nominations for election to the Board of Directors or for proposing matters that can be acted on by stockholders at stockholder meetings.

As a Delaware corporation, we are also subject to provisions of Delaware law, including Section 203 of the Delaware General Corporation law, which prevents some stockholders holding more than 15% of our outstanding common stock from engaging in certain business combinations without approval of the holders of substantially all of our outstanding common stock.

These provisions of our amended and restated certificate of incorporation, our amended and restated by-laws or Delaware law could have the effect of delaying or deterring a change in control that some stockholders may consider beneficial and therefore could limit the opportunity for our stockholders to receive a premium for their shares of our common stock and could also affect the price that some investors are willing to pay for our common stock.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

During 2019, we initiated a plan to consolidate and reduce the number of our facilities worldwide. This included plans to provide a new customer experience center for product demonstration and training, relocate and consolidate our laboratories, server farms and Cloud service infrastructure and condense research and development, sales, marketing, business operations

and administrative functions into our new Plano campus. We substantially completed these relocation and other site closure activities in 2020.

We also lease smaller (under 50,000 square feet) office space in various countries around the world for sales, marketing, research and development/engineering, and customer services and support staff, as well as for warehouse purposes. We are exiting certain of these facilities. We believe our remaining facilities will be adequate for our current needs and that suitable additional space will be available as needed.

As of December 31, 2020, we maintained the following principal facilities:

Location	Principal use	Lease expiration
Westford, Massachusetts	Corporate headquarters (through February 26, 2021), research and development/engineering, sales, customer support, general and administrative	August 2028
Plano, Texas (a)	Corporate headquarters (effective February 26, 2021), sales, marketing, research and development/engineering, customer support, general and administrative	September 2032
Plano, Texas (b)	Research and development/engineering, customer support	February 2022
Research Triangle Park, North Carolina	Research and development/engineering, sales, customer support, general and administrative	April 2027
Ottawa, Canada (c)	Research and development/engineering, customer support, general and administrative	December 2029
Petah Tikva, Israel (c)	Sales, service, research and development/engineering	September 2023
Petah Tikva, Israel (c)	Service, research and development/engineering, general and administrative	October 2023
Bangalore, India	Research and development/engineering, customer support, general and administrative	October 2024
Bangalore, India	Research and development/engineering, customer support, general and administrative	December 2023

(a) Employees were relocated from the Plano, Texas facility to this facility (the "new Plano facility") in the fourth quarter of 2020. Laboratory equipment and operations are still in the process of being relocated to this facility from the Plano, Texas facility. These relocation actions are part of our restructuring initiative to consolidate our North Texas operations.
(b) We are finalizing the relocation of this facility's operations to the new Plano facility (see note (a) above).
(c) A portion of this facility was not in use at December 31, 2020 and is currently being subleased as part of a restructuring initiative.

Item 3. Legal Proceedings

We are subject to legal proceedings and claims that have not been fully resolved and that have arisen in the ordinary course of business. Our material legal proceedings are described in Part II, Item 8 of this Form 10-K in the Notes to Consolidated Financial Statements in Note 27, "Commitments and Contingencies" under the heading "Contingencies".

The outcome of litigation is inherently uncertain. If one or more legal matters were resolved against the Company in a reporting period for amounts above management's expectations, our financial condition and operating results for that reporting period could be materially adversely affected. We settled certain matters during the fourth quarter of 2020 that did not individually or in the aggregate have a material impact on our financial condition or operating results.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

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

Market Information

Effective November 29, 2017, our common stock was quoted on The Nasdaq Global Select Market under the symbol "RBBN." Our common stock began publicly trading on The Nasdaq Global Select Market on October 30, 2017 under the symbol "SONS," following the merger of Sonus Networks, Inc. and GENBAND.

Holders

At February 22, 2021, there were approximately 398 holders of record of our common stock.

Recent Sales of Unregistered Securities

None.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

The following table summarizes repurchases of our common stock during the fourth quarter of 2020:

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 (2)	Approximate Dollar Value of Shares that May Yet be Purchased Under the Plans or Programs (3)
October 1, 2020 to October 31, 2020	4,289	$ 3.92	—	$ 70,463,973
November 1, 2020 to November 30, 2020	71,100	$ 4.67	—	$ 70,463,973
December 1, 2020 to December 31, 2020	23,367	$ 6.26	—	$ 70,463,973
Total	98,756	$ 5.01	—	$ 70,463,973

(1) Upon vesting of restricted stock awards, certain of our employees may return to us a portion of the newly vested shares to satisfy the tax withholding obligations that arise in connection with such vesting. During the fourth quarter of 2020, 98,756 shares of restricted stock were returned to us by employees to satisfy tax withholding obligations arising in connection with vesting of restricted stock, which shares are included in this column.

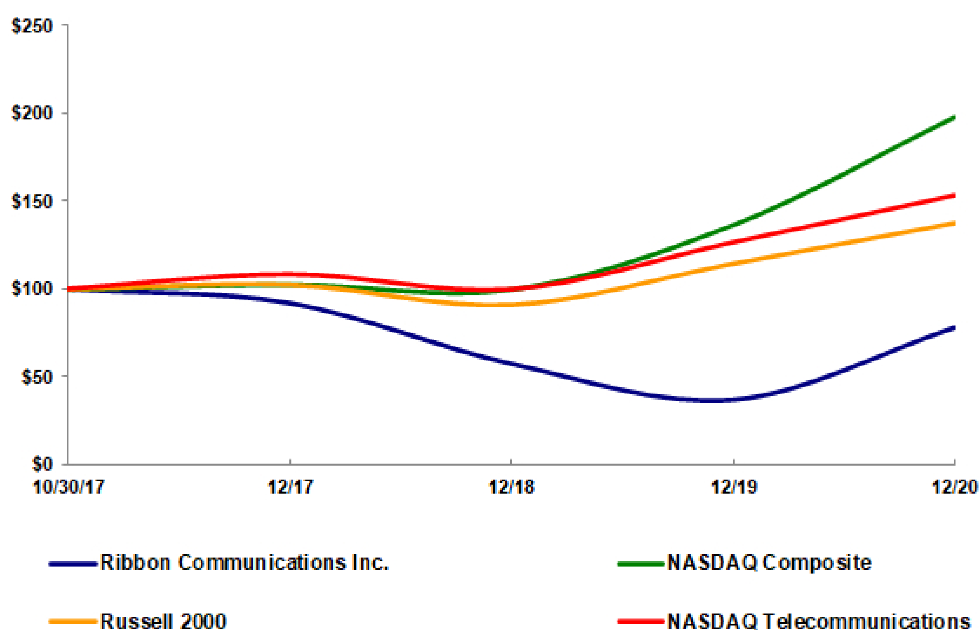
(2) On May 2, 2019, we announced a stock repurchase program, under which our Board of Directors has authorized the repurchase of up to $75 million of our common stock from time to time on the open market or in privately negotiated transactions prior to April 18, 2021 (the "Repurchase Program"). We did not repurchase any shares of our common stock under the Repurchase Program during the fourth quarter of 2020. At December 31, 2020, we had $70.5 million remaining under the Repurchase Program for future repurchases. The timing and amount of any shares repurchased will be determined by our management based on its evaluation of market conditions and other factors. We may elect to implement a 10b5-1 repurchase program, which would permit shares to be repurchased when we might otherwise be precluded from doing so under insider trading laws. The Repurchase Program may be suspended or discontinued at any time. The Repurchase Program is being funded using our working capital.

(3) Represents amounts available for repurchases under the Repurchase Program.

Performance Graph

The following performance graph compares the cumulative total return to stockholders for our common stock for the period from October 30, 2017 (the date Ribbon's common stock began trading on Nasdaq) through December 31, 2020 with the cumulative total return over the same period on the Nasdaq Composite Index, the Nasdaq Telecommunications Index and the Russell 2000. The comparison assumes an investment of $100 on October 30, 2017 in our common stock and in each of the indices and, in each case, assumes reinvestment of all dividends, if any. The performance shown is not necessarily indicative of future performance.

This graph is not deemed to be "filed" with the SEC or subject to the liabilities of Section 18 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and should not be deemed to be incorporated by reference into any of our prior or subsequent filings under the Securities Act of 1933, as amended, or the Exchange Act.



	October 30, 2017	December 31, 2017	December 31, 2018	December 31, 2019	December 31, 2020
Ribbon Communications Inc.	$ 100.00	$ 92.13	$ 57.45	$ 36.95	$ 78.19
Nasdaq Composite	$ 100.00	$ 102.83	$ 99.91	$ 136.58	$ 197.92
Russell 2000	$ 100.00	$ 102.47	$ 91.18	$ 114.45	$ 137.30
Nasdaq Telecommunications	$ 100.00	$ 108.44	$ 99.78	$ 126.61	$ 153.38

Item 6. Selected Financial Data

In 2020, the Company reclassified amounts recorded for amortization of acquired intangible assets in prior period presentations from both Cost of revenue - product and Sales and marketing to a separate line now included in operating expenses in the consolidated statements of operations. Management believes this presentation enhances the comparability of the Company's financial statements to industry peers. These reclassifications did not impact operating loss, net loss or loss per share for any historical periods. These reclassifications also did not impact the consolidated balance sheets or statements of cash flows.

On October 27, 2017, (the "GENBAND Merger Date"), Sonus Networks, Inc. ("Sonus") and GENBAND Holdings Company, GENBAND, Inc. and GENBAND II, Inc. (collectively, "GENBAND") completed a merger (the "GENBAND Merger"). The following table presents selected consolidated financial data of Sonus prior to the Merger Date and selected consolidated financial data of Ribbon, on and after the Merger Date. The selected consolidated financial data set forth below as of December 31, 2020 and 2019 and for each of the years ended December 31, 2020, 2019 and 2018 have been derived from the audited consolidated financial statements included elsewhere herein. The selected consolidated financial data set forth below as of December 31, 2018, 2017 and 2016 and for each of the years ended December 31, 2017 and 2016 have been derived from audited consolidated financial statements not included elsewhere herein. The following selected consolidated financial data should be read in conjunction with "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our consolidated financial statements and notes thereto included elsewhere in this Annual Report on Form 10-K.

Consolidated Statement of Operations Data	Year ended December 31,				
(In thousands, except per share amounts)	**2020 (1)**	**2019 (2)**	**2018 (3)**	**2017 (4)**	**2016 (5)**
Revenue:					
Product	$ 467,912	$ 262,030	$ 279,014	$ 181,119	$ 146,381
Service	375,883	301,081	298,891	148,823	106,210
Total revenue	843,795	563,111	577,905	329,942	252,591
Cost of revenue:					
Product	204,772	95,774	103,209	51,892	41,329
Service	145,916	112,680	127,388	58,196	37,613
Total cost of revenue	350,688	208,454	230,597	110,088	78,942
Gross profit	493,107	354,657	347,308	219,854	173,649
Operating expenses:					
Research and development	194,525	141,060	145,462	101,481	72,841
Sales and marketing	139,318	106,310	117,529	79,178	67,077
General and administrative	63,286	53,870	66,036	47,642	35,948
Amortization of acquired intangible assets	60,910	49,225	49,723	22,583	7,500
Impairment of goodwill	—	164,300	—	—	—
Acquisition-, disposal- and integration-related	17,164	12,953	16,951	14,763	1,152
Restructuring and related	16,235	16,399	17,015	9,436	2,740
Total operating expenses	491,438	544,117	412,716	275,083	187,258
Income (loss) from operations	1,669	(189,460)	(65,408)	(55,229)	(13,609)
Interest and other income (expense), net	91,648	66,567	(8,002)	1,537	2,193
Income (loss) before income taxes	93,317	(122,893)	(73,410)	(53,692)	(11,416)
Income tax (provision) benefit	(4,726)	(7,182)	(3,400)	18,440	(2,516)
Income (loss) from continuing operations	88,591	(130,075)	(76,810)	(35,252)	(13,932)
Net income (loss)	$ 88,591	$ (130,075)	$ (76,810)	$ (35,252)	$ (13,932)
Loss per share:					
Basic					
Continuing operations	$ 0.64	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)
	$ 0.64	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)
Diluted					
Continuing operations	$ 0.61	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)
	$ 0.61	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)
Shares used to compute loss per share:					
Basic	138,967	109,734	103,916	58,822	49,385
Diluted	144,650	109,734	103,916	58,822	49,385

(1) Includes $260.5 million of revenue and $52.9 million of net loss attributable to ECI Telecom Group Ltd for the period subsequent to its acquisition by the Company on March 3, 2020.
(2) Includes the results of operations of Anova Data, Inc. for the period subsequent to its acquisition by the Company on February 28, 2019. The technology of Anova has been integrated into Ribbon's existing products and accordingly, the results of operations are neither recorded nor disclosed separately. The reclassifications described above and reflected in these results of operations include reductions to Cost of revenue - product and Sales and marketing expense of $37.6 million and $11.6 million, respectively, and the amounts were reclassified to Amortization of acquired intangible assets.
(3) Includes $21.5 million of revenue and $4.3 million of net loss attributable to Edgewater for the period subsequent to its acquisition by the Company on August 3, 2018. The reclassifications described above and reflected in these results of operations include reductions to Cost of revenue - product and Sales and marketing expense of $39.0 million and $10.7 million, respectively, and the amounts were reclassified to Amortization of acquired intangible assets.
(4) Includes $69.1 million of revenue and $12.5 million of net loss attributable to GENBAND for the period subsequent to the Merger on October 27, 2017. The reclassifications described above and reflected in these results of operations include reductions to Cost of revenue - product and Sales and marketing expense of $18.4 million and $4.2 million, respectively, and the amounts were reclassified to as Amortization of acquired intangible assets.
(5) Includes $1.9 million of revenue and $4.7 million of net loss attributable to Taqua, LLC for the period subsequent to its acquisition by the Company on September 26, 2016. The reclassifications described above and reflected in these results of operations include reductions to Cost of revenue - product and Sales and marketing expense of $6.0 million and $1.5 million, respectively, and the amounts were reclassified to Amortization of acquired intangible assets.

Consolidated Balance Sheet Data	December 31,				
(In thousands)	**2020**	**2019**	**2018**	**2017**	**2016**
Cash and cash equivalents	$ 128,428	$ 44,643	$ 43,694	$ 57,073	$ 31,923
Restricted cash	$ 7,269	$ —	$ —	$ —	$ —
Marketable securities	$ —	$ —	$ 7,284	$ 17,224	$ 61,836
Investments	$ 115,183	$ —	$ —	$ 9,031	$ 32,371
Working capital	$ 120,016	$ 72,558	$ (11,219)	$ 39,417	$ 100,845
Total assets	$ 1,547,265	$ 814,908	$ 957,159	$ 910,883	$ 308,059
Current portion of long-term debt	$ 15,531	$ 2,500	$ —	$ —	$ —
Revolving credit facility	$ —	$ 8,000	$ 55,000	$ 20,000	$ —
Long-term debt, net of current	$ 369,035	$ 45,995	$ —	$ —	$ —
Long-term debt, related party	$ —	$ —	$ 24,100	$ 22,500	$ —
Long-term deferred revenue	$ 26,010	$ 20,482	$ 17,572	$ 14,184	$ 7,188
Other long-term obligations	$ 48,281	$ 16,589	$ 30,797	$ 13,189	$ 1,633
Total stockholders' equity	$ 686,853	$ 483,255	$ 590,298	$ 615,421	$ 219,122

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

Overview

We are a leading global provider of communications technology to service providers and enterprises. We provide a broad range of software and high-performance hardware products, solutions and services that enable the secure delivery of data and voice communications for residential consumers and for small, medium and large enterprises and industry verticals such as finance, education, government, utilities and transportation. Our mission is to create a recognized global technology leader providing cloud-centric solutions that enable the secure exchange of information, with unparalleled scale, performance and elasticity. Headquartered in Plano, Texas, we have a global presence with research and development and/or sales and support locations in over thirty-five countries around the world.

Impact of COVID-19 on Our Business

In 2020, a novel strain of the coronavirus (COVID-19) was declared by the World Health Organization to be a global pandemic. The COVID-19 pandemic has had a negative effect on the global economy, disrupting the various manufacturing, commodity and financial markets and increasing volatility, and has impeded global supply chains, including that of our IP Optical Networks operating segment. Continued dampened global economic conditions as a result of the COVID-19 pandemic may cause our customers to restrict spending or delay purchases for an indeterminate period of time and consequently cause our revenues to decline. In addition, our ability to deliver our solutions as agreed upon with our customers depends on the ability of our global contract manufacturers, vendors, licensors and other business partners to deliver products or perform services we have procured from them. While, to date, we have not experienced material issues, if the continuing COVID-19 pandemic impairs the ability of our business partners to support us on a timely basis, or negatively impacts the demand for our customers' other products and services, our ability to perform our customer contracts as well as the demand for our solutions may suffer. In addition, disruptions from the COVID-19 pandemic could include, and with respect to our IP Optical Networks operating segment have included, disruption of logistics necessary to import, export and deliver our solutions. The COVID-19 pandemic has also limited the ability of our associates to perform their work due to illness caused by the pandemic or local, state or federal orders requiring associates to remain at home. Concerns over the economic impact of the COVID-19 pandemic have also caused extreme volatility in financial and other capital markets which has and may continue to adversely impact our stock price. Such volatility may also adversely impact our ability to access capital markets if and when we would be required to do so. The degree to which the COVID-19 pandemic ultimately impacts our business, financial position and results of operations will depend on future developments beyond our control, including the severity of the pandemic, the frequency and duration of future waves of infection, the effectiveness and timing of any vaccines, the extent of actions to contain or treat the virus, how quickly and to what extent normal economic and operating conditions can resume, and the severity and duration of the global economic downturn that results from the pandemic.

As a response to the ongoing COVID-19 pandemic, we have implemented plans to manage our costs. As part of that plan, we implemented a temporary wage reduction of 10% to 50% applicable to the base salary of most of our employees, which salary reduction has now ended. We have significantly limited the addition of new employees and third-party contracted services, eliminated all travel except where necessary to meet customer or regulatory needs, and acted to limit discretionary spending. To the extent the business disruption continues for an extended period, additional cost management actions will be considered. Any future asset impairment charges, increases in the allowance for doubtful accounts or restructuring charges could be more likely and will be dependent on the severity and duration of this crisis.

Presentation

Unless otherwise noted, all financial amounts, excluding tabular information, in this MD&A are rounded to the nearest million dollar amount, and all percentages, excluding tabular information, are rounded to the nearest percentage point.

Reclassification of Amortization of Acquired Intangible Assets

In 2020, we reclassified amounts recorded for amortization of acquired intangible assets in prior presentations from Cost of revenue - product and Sales and marketing to a separate line included in operating expenses in our consolidated statements of operations. Our Management believes this presentation enhances the comparability of our financial statements to industry peers. These reclassifications did not impact our operating income (loss), net income (loss) or earnings (loss) per share for any historical periods. These reclassifications also did not impact our consolidated balance sheets or consolidated statements of cash flows.

These reclassifications resulted in reductions to Cost of revenue - product and Sales and marketing of $37.6 million and

$11.6 million, respectively, reclassified to Amortization of acquired intangible assets in the year ended December 31, 2019. The reduction to Cost of revenue - product increased our product gross profit as a percentage of product revenue ("product gross margin") and our total gross profit as a percentage of revenue ("total gross margin) by 14 and 7 percentage points, respectively.

These reclassifications resulted in reductions to Cost of revenue - product and Sales and marketing of $39.0 million and $10.7 million, respectively, reclassified to Amortization of acquired intangible assets in the year ended December 31, 2018. The reduction to Cost of revenue - product increased our product gross profit as a percentage of product revenue and our total gross profit as a percentage of revenue by 14 and 7 percentage points, respectively.

Business Acquisitions

ECI Telecom Group Ltd

On March 3, 2020 (the "ECI Acquisition Date"), we completed the acquisition of ECI in accordance with the terms of the Agreement and Plan of Merger, dated as of November 14, 2019, by and among Ribbon, an indirect wholly-owned subsidiary of Ribbon ("Merger Sub"), Ribbon Communications Israel Ltd., ECI, and ECI Holding (Hungary) kft, pursuant to which Merger Sub merged with and into ECI, with ECI surviving such merger as a wholly-owned subsidiary of Ribbon (the "ECI Acquisition"). Prior to the ECI Acquisition Date, ECI was a privately-held global provider of end-to-end packet-optical transport and software-defined networking ("SDN") and network function virtualization ("NFV") solutions for service providers, enterprises and data center operators. Ribbon believes the ECI Acquisition positions the Company for growth and enhances its competitive strengths by expanding its product portfolio beyond solutions primarily supporting voice applications to include data applications and optical networking.

As consideration for the ECI Acquisition, we issued the ECI shareholders and certain others 32.5 million shares of Ribbon common stock with a fair value of $108.6 million (the "Stock Consideration") and paid $322.5 million of cash, comprised of $183.3 million to repay ECI's outstanding debt, including both principal and interest, and $139.2 million paid to ECI's selling shareholders (the "Cash Consideration"). In addition, ECI shareholders received $33.4 million from the sale of certain of ECI's real estate assets. Cash Consideration was financed through cash on hand and committed debt financing consisting of a new $400 million term loan facility and new $100 million revolving credit facility, which was undrawn at the ECI Acquisition Date. The ECI Acquisition has been accounted for as a business combination and the financial results of ECI have been included in our consolidated financial statements for the periods subsequent to the ECI Acquisition Date.

Anova Data, Inc.

On February 28, 2019 (the "Anova Acquisition Date"), we acquired the business and technology assets of Anova Data, Inc. ("Anova"), a private company headquartered in Westford, Massachusetts (the "Anova Acquisition"). Anova is a provider of advanced analytics solutions and its next generation products provide a cloud-native, streaming analytics platform for network and subscriber optimization and monetization. The Company believes that the Anova Acquisition will reinforce and extend Ribbon's strategy to expand into network optimization, security and data monetization via big data analytics and machine learning.

As consideration for the Anova Acquisition, we issued 2.9 million shares of our common stock with a fair value of $15.2 million to Anova's sellers and equity holders on the Anova Acquisition Date and held back an additional 330,000 shares of our common stock with a fair value of $1.7 million (the "Deferred Purchase Consideration"), of which 316,551 shares were issued after post-closing adjustments on March 4, 2020. The Deferred Purchase Consideration was included as a component of Accrued expenses and other in our consolidated balance sheet at December 31, 2019. The Anova Acquisition has been accounted for as a business combination and the financial results of Anova have been included in our consolidated financial statements for the periods subsequent to the Anova Acquisition Date.

Edgewater Networks, Inc.

On August 3, 2018 (the "Edgewater Acquisition Date") we completed our acquisition of Edgewater Networks, Inc. ("Edgewater"), a private company headquartered in San Jose, California (the "Edgewater Acquisition"). Edgewater is a market leader in Network Edge Orchestration for the small and medium enterprise and UC market. We believe that the acquisition of Edgewater allows us to offer our global customer base a complete core-to-edge product portfolio, end-to-end service assurance and analytics solutions, and a fully integrated SD-WAN service.

As consideration for the Edgewater Acquisition, we paid, in the aggregate, $46.4 million of cash, net of cash acquired, and

issued 4.2 million shares of Ribbon common stock to Edgewater's selling shareholders and holders of vested in-the-money options and warrants to acquire common stock of Edgewater (the "Edgewater Selling Stakeholders") on the Edgewater Acquisition Date. The cash payment was funded through our then-current credit facility. We had previously agreed to pay the Edgewater Selling Stakeholders an additional $30.0 million of cash, $15.0 million of which was to be paid six months from the Edgewater Acquisition Date and the other $15.0 million of which was to be paid as early as nine months from the Edgewater Acquisition Date (the exact timing of which would depend on the amount of revenue generated from the sales of Edgewater products in 2018) (the "Edgewater Deferred Consideration").

On February 15, 2019, we and the Edgewater Selling Stakeholders agreed to reduce the amount of Edgewater Deferred Consideration from $30 million to $21.9 million and agreed that all such deferred consideration would be payable on March 8, 2019. We paid the Edgewater Selling Stakeholders $21.9 million on March 8, 2019 and recorded the $8.1 million reduction to the Edgewater Deferred Consideration in Other income (expense), net, in our consolidated statement of operations for the year ended December 31, 2019.

The Edgewater Acquisition has been accounted for as a business combination and the financial results of Edgewater have been included in our consolidated financial statements for the period subsequent to the Edgewater Acquisition Date.

Sale of Kandy Communications Business

On August 5, 2020, we announced that we had entered into a definitive agreement (the "Kandy Purchase Agreement") with American Virtual Cloud Technologies, Inc. ("AVCT") to sell our cloud-based enterprise services business (the "Kandy Communications Business"). Under the Kandy Purchase Agreement, AVCT would purchase the assets and assume certain liabilities associated with the Kandy Communications Business, as well as all of the outstanding interests in our Kandy Communications LLC subsidiary (the "Kandy Sale").

On December 1, 2020, we and AVCT entered into an amended and restated Purchase Agreement (the “Amended Kandy Agreement”). Under the terms of the Amended Kandy Agreement, AVCT agreed to pay us $45.0 million, subject to certain adjustments, in the form of units of AVCT’s securities (the “AVCT Units”), with each AVCT Unit consisting of: (i) $1,000 in principal amount of AVCT’s Series A-1 convertible debentures (the “Debentures”); and (ii) one warrant to purchase 100 shares of AVCT common stock, $0.0001 par value (the “Warrants”), as consideration for the Kandy Sale (the "Kandy Consideration"). The Kandy Sale was completed on December 1, 2020 (the "Kandy Sale Date"), and we received 43,778 AVCT Units as sale consideration on that date.

The Debentures bear interest at a rate of 10% per annum, which will be added to the principal amount of the Debentures, except upon maturity, in which case accrued and unpaid interest is payable in cash. The entire principal of each Debenture, together with accrued and unpaid interest thereon, is due and payable on the earlier of the May 1, 2023 maturity date or the occurrence of a Change in Control as defined in the Amended Kandy Agreement. Each Debenture is convertible, in whole or in part, at any time at our option into that number of shares of AVCT common stock, calculated by dividing the principal amount being converted, together with all accrued and unpaid interest thereon, by the applicable conversion price, initially $3.45. The Debentures are subject to mandatory redemption if the AVCT stock price is at or above $6.00 per share for 40 trading days in any 60 consecutive trading day period, subject to the satisfaction of certain other conditions. The conversion price is subject to customary adjustments including, but not limited to, stock dividends, stock splits and reclassifications. At our option, up to $5.0 million of the Debentures may be redeemed by AVCT at par in the event AVCT raises at least $50.0 million in its offering of AVCT Units. As of February 19, 2021, the stock had traded above $6.00 for 40 days within a 60 consecutive day trading period and accordingly, the Debentures will be converted to shares of AVCT common stock upon the completion of customary and regulatory filings by AVCT.

The Warrants are independent of the Debentures and entitle us to purchase 4,377,800 shares of AVCT common stock at an exercise price of $0.01 per share. The Warrants expire on December 1, 2025, and were immediately exercisable on the Kandy Sale Date.

We had not redeemed any of the Debentures or exercised any of the Warrants as of December 31, 2020. We are also subject to a lock-up provision which limits our ability to sell any shares of AVCT common stock underlying the Debentures and the Warrants prior to June 1, 2021, except in certain transactions.

We determined that the AVCT Units had a fair value of $84.9 million at the Kandy Sale Date, comprised of the Debentures with a fair value of $66.3 million and the Warrants with a fair value of $18.6 million. The value of the net assets sold to AVCT totaled $1.3 million, resulting in a gain on the sale of $83.6 million. This amount is included as a component of Other income (expense), net, in our consolidated statement of operations for the year ended December 31, 2020.

The fair value of the Debentures was calculated using a Lattice-based valuation approach, which utilizes a binomial tree to model the different paths the price of AVCT's common stock might take over the Debentures' life by using assumptions regarding the stock price volatility and risk-free interest rate. These results are then used to calculate the fair value of the Debentures at each measurement date. The Company uses the Black-Scholes valuation model for estimating the fair value of the Warrants at each measurement date. The fair value of the Warrants is affected by AVCT's stock price as well as valuation assumptions, including the volatility of AVCT's stock price, expected term of the option, risk-free interest rate and expected dividends. Both the Lattice and Black-Scholes valuation models are based on available market data, giving consideration to all of the rights and obligations of each instrument and precluding the use of "blockage" discounts or premiums in determining the fair value of a large block of financial instruments.

We will calculate the fair value of the Debentures and Warrants at each quarter-end and record any adjustments to the fair values in Other income (expense), net. At December 31, 2020, the aggregate fair value of the Debentures and Warrants was calculated as $115.2 million, resulting in a gain of $30.3 million in the increase in fair values of the Debentures and Warrants. This gain is included as a component of Other income (expense), net, in our consolidated statement of operations. The fair values of the Debentures and Warrants are reported as Investments in our consolidated balance sheet at December 31, 2020. The results of the Kandy Communications Business are excluded from our consolidated results for the period subsequent to the Kandy Sale Date.

Litigation Settlement

On April 22, 2019, we and Metaswitch Networks Ltd., Metaswitch Networks Corp and Metaswitch Inc. (collectively, "Metaswitch") agreed to a binding mediator's proposal that resolves the six previously disclosed lawsuits between the Company and Metaswitch (the "Lawsuits"). We and Metaswitch signed a Settlement and Cross-License Agreement on May 29, 2019 (the "Royalty Agreement"). Pursuant to the terms of the Royalty Agreement, Metaswitch agreed to pay us an aggregate amount of $63.0 million, which included cash payments of $37.5 million during the second quarter of 2019 and $25.5 million payable in three installments annually, beginning June 26, 2020, with such installment payments accruing interest at a rate of 4% per year. As part of the Royalty Agreement, we and Metaswitch have (i) released the other from all claims and liabilities; (ii) licensed each party's existing patent portfolio to the other party; and (iii) requested the applicable courts to dismiss the Lawsuits. We received $37.5 million of aggregate payments from Metaswitch in the second quarter of 2019 and recorded notes receivable for future payments of $25.5 million, comprised of $8.5 million in Other current assets and $17.0 million in Other assets in our consolidated balance sheet at December 31, 2019. We recorded the $63.0 million gain in Other income (expense), net, in our consolidated statement of operations for the year ended December 31, 2019. We received $37.5 million of aggregate payments from Metaswitch in the second quarter of 2019 and $9.5 million, including $1.0 million of interest, in the second quarter of 2020.

On July 6, 2020, we and Metaswitch signed a First Supplemental Agreement to the Settlement and Cross-License Agreement (the "Supplemental Agreement") under which Metaswitch could elect to repay the outstanding amounts under the Royalty Agreement early in exchange for a reduction of $0.25 million to the outstanding principal, from $17.0 million to $16.75 million, and the payment of no further interest by Metaswitch effective June 26, 2020. We recorded the reduction to the outstanding principal as a reduction to interest income. On July 14, 2020, Metaswitch paid us the remaining outstanding balance of $16.75 million.

Operating Segments

Our chief operating decision maker (the "CODM") is our president and chief executive officer. Effective in the fourth quarter of 2020 and in connection with the ECI Acquisition, our CODM began to assess our performance based on the performance of two separate organizations within Ribbon: the Cloud and Edge operating segment ("Cloud and Edge") and the IP Optical Networks operating segment ("IP Optical Networks"). We previously operated in a single segment, as our CODM made decisions and assessed performance at the company level, and for periods prior to the ECI Acquisition, there are no financial results for IP Optical Networks to report.

Our Cloud and Edge operating segment is primarily comprised of the legacy Ribbon business and provides secure and reliable software and hardware products, solutions and services for enabling Voice over Internet Protocol ("VoIP") communications, Voice over Long-Term Evolution ("VoLTE") and Voice Over 5G ("VoNR") communications and Unified Communications and Collaboration ("UC&C") within service provider and enterprise networks and from the cloud. Our Cloud and Edge products are increasingly software-centric and cloud-native for deployment on private, public or hybrid cloud infrastructures, in data centers, on enterprise premises and within service provider networks. Our Cloud and Edge product portfolio consists of our Session Border Controller ("SBC") products and our Network Transformation ("NTR") products.

Our IP Optical Networks operating segment is primarily comprised of the former ECI business and provides high-performance, secure and reliable hardware and software products solutions for IP networking, switching, routing and optical transport designed to support and enable technologies like 5G, distributed cloud computing and corresponding applications by delivering ultra-low cost-per-bit transport and multi-service flexibility. Our IP Optical Networks portfolio offers multiple solutions, including 5G-native solutions for mobile backhaul, metro and edge aggregation, core networking, data center interconnect, legacy NTR and transport solutions for wholesale carriers. This portfolio is offered to service provider, enterprise and industry verticals with critical transport network infrastructures including utilities, government, defense, transportation, and education and research.

Financial Overview

Financial Results

We reported income from operations of $2 million for 2020 and a loss from operations of $189 million for 2019. We reported net income of $89 million for 2020 and a net loss of $130 million for 2019.

Our revenue was $844 million in 2020, comprised of $583 million attributable to Cloud and Edge and $261 million attributable to IP Optical Networks. Our revenue was $563 million in 2019. Our gross profit was $493 million in 2020, comprised of $384 million attributable to Cloud and Edge and $109 million attributable to IP Optical Networks. Our gross profit was $355 million in 2019. Our gross profit as a percentage of revenue ("total gross margin") was 58% in 2020 and 63% in 2019. In 2020, our Cloud and Edge total gross margin was 66% and our IP Optical Networks total gross margin was 42%.

Our operating expenses were $491 million in 2020 and $544 million in 2019. Our 2020 operating expenses included $61 million of amortization of acquired intangible assets, $17 million of acquisition-, disposal- and integration-related expense, and $16 million of restructuring and related expense. Our 2019 operating expenses included $164 million for the impairment of goodwill, $49 million of amortization of acquired intangible assets, $13 million of acquisition-, disposal- and integration-related expense, and $16 million of restructuring expense.

We recorded stock-based compensation expense of $14 million in 2020 and $13 million in 2019. The expense recorded in 2019 includes $2 million of incremental expense related to the accelerated vesting of RSUs and PSUs held by our former president and chief executive officer in connection with his separation from the Company effective December 31, 2019.

See "Results of Operations" in this MD&A for additional discussion of our results of operations for the years ended December 31, 2020 and 2019.

Restructuring and Cost Reduction Initiatives

In 2020, we implemented a restructuring plan to eliminate certain positions and redundant facilities, primarily in connection with the ECI Acquisition, to further streamline our global footprint and improve our operations (the "2020 Restructuring Initiative"). The 2020 Restructuring Initiative includes facility consolidations and a reduction in workforce, including severance aggregating $1.1 million for three former executives of ECI. In connection with this initiative, we expect to eliminate duplicate functions arising from the ECI Acquisition and support our efforts to integrate the two companies. In connection with the 2020 Restructuring Initiative, we recorded restructuring and related expense of $14.0 million in 2020, comprised of $11.5 million for severance and related costs for approximately 190 employees, including the former executives of ECI, $2.0 million for variable and other facilities-related costs, and $0.5 million for accelerated amortization of lease assets. We expect these amounts will be fully paid in 2021. We expect to record additional restructuring and related expense approximating $8 million under the 2020 Restructuring Initiative in the aggregate for severance and planned facility consolidations.

In June 2019, we implemented a restructuring plan to further streamline our global footprint, improve our operations and enhance our customer delivery (the "2019 Restructuring Initiative"). The 2019 Restructuring Initiative includes facility consolidations, refinement of our research and development activities, and a reduction in workforce. The facility consolidations under the 2019 Restructuring Initiative (the "Facilities Initiative") include a consolidation of our North Texas sites into a single campus, housing engineering, customer training and support, and administrative functions, as well as a reduction or elimination of certain excess and duplicative facilities worldwide. In addition, we intend to substantially consolidate our global software laboratories and server farms into two lower cost North American sites. We continue to evaluate our properties included in the Facilities Initiative for accelerated amortization and/or right-of-use asset impairment. We expect that the actions under the Facilities Initiative will be completed in 2021.

In connection with the 2019 Restructuring Initiative, we recorded restructuring and related expense of $2.3 and $11.2 million in 2020 and 2019, respectively. The amount recorded in 2020 was comprised of $0.5 million for severance and related costs for approximately 5 employees, $1.7 million for variable and other facilities-related costs and $0.1 million for accelerated amortization of lease assets. The amount recorded in 2019 was comprised of $6.1 million for severance and related costs for approximately 120 employees, $1.4 million for variable and other facilities-related costs and $3.7 million for accelerated amortization of lease assets. We expect that the amount accrued for severance and related costs will be paid in 2021. We estimate that we will record nominal, if any, future expense related to this initiative.

Accelerated rent amortization is recognized from the date that we commence the plan to fully or partially vacate a facility, for which there is no intent or ability to enter into a sublease, through the final vacate date. We recorded $0.6 million and $3.7 million of expense for accelerated rent amortization in the years ended December 31, 2020 and 2019, respectively. These amounts are included as components of Restructuring and related expense. The accelerated rent amortization recorded in connection with our restructuring initiatives reduced our Operating lease right-of-use assets in our consolidated balance sheets at December 31, 2020 and 2019. We continue to evaluate our properties included in the Facilities Initiative for accelerated amortization and/or right-of-use asset impairment. We may incur additional future expense if we are unable to sublease other locations included in the Facilities Initiative.

In connection with the Sonus-GENBAND merger (the "GENBAND Merger") in 2017, we implemented a restructuring plan in the fourth quarter of 2017 to eliminate certain redundant positions and facilities within the combined companies (the "GENBAND Merger Restructuring Initiative"). We recorded a nominal adjustment for changes in estimated severance and related costs in 2020. We recorded $5 million in 2019, virtually all of which was for severance and related costs for approximately 40 employees. We recorded $16 million of restructuring expense related to this initiative in 2018, comprised of $15 million for severance and related costs for approximately 275 employees and $1 million in connection with redundant facilities located in the Czech Republic, Canada and the U.S. The actions under the GENBAND Merger Restructuring Initiative were completed in the second quarter of 2019, with the related payments completed in 2020.

We assumed GENBAND's restructuring liability aggregating $4 million at the Merger Date (the "GENBAND Restructuring Initiative"), primarily related to headcount reductions. We recorded $1 million of restructuring expense in 2018 for changes in estimated costs for previously recorded initiatives, primarily changes in negotiated severance to employees in certain international locations and changes in estimated sublease income for restructured facilities. In connection with the adoption of ASC 842 effective January 1, 2019, we wrote off the remaining restructuring accrual related to facilities. The GENBAND Restructuring Initiative is complete.

Critical Accounting Policies and Estimates

Management's discussion and analysis of the financial condition and results of operations is based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. We base our estimates and judgments on historical experience, knowledge of current conditions and beliefs of what could occur in the future given available information. We consider the following accounting policies to be both those most important to the portrayal of our financial condition and those that require the most subjective judgment. If actual results differ significantly from management's estimates and projections, there could be a material effect on our consolidated financial statements. The significant accounting policies that we believe are the most critical include revenue recognition, the valuation of inventory, debentures and warrants received as sale consideration, warranty accruals, loss contingencies and reserves, stock-based compensation, business combinations, goodwill and intangible assets and accounting for income taxes.

***Revenue Recognition*.** We derive revenue from two primary sources: products and services. Product revenue is generated from sales of our stand-alone software, as well as software with attached hardware that function together to deliver the products' essential functionality. Both software and hardware are also sold on a standalone basis. Services include customer support (software updates and technical support), consulting, design services, installation services and training. A typical contract includes both product and services. Generally, contracts with customers contain multiple performance obligations. For these contracts, we account for individual performance obligations separately if they are distinct. The transaction price is allocated to the separate performance obligations on a relative standalone selling price basis. SSPs are typically estimated based on observable transactions when these services are sold on a standalone basis.

The software licenses typically provide a perpetual right to use our software. We also sell term-based software licenses that expire and Software-as-as-Service ("SaaS")-based software, which are referred to as subscription arrangements. We do not

customize our software nor are installation services required, as the customer has a right to utilize internal resources or a third-party service company. The software and hardware are delivered before related services are provided and are functional without professional services or customer support. We have concluded that our software licenses are functional intellectual property that are distinct, as the user can benefit from the software on its own. The product revenue is typically recognized upon transfer of control or when the software is made available for download, as this is the point that the user of the software can direct the use of, and obtain substantially all of the remaining benefits from, the functional intellectual property. We begin to recognize software revenue related to the renewal of subscription software licenses at the start of the subscription period.

Service revenue includes revenue from customer support and other professional services. We offer warranties on our products. Certain of our warranties are considered to be assurance-type in nature, ensuring that the product is functioning as intended. Assurance-type warranties do not represent separate performance obligations. We also sell separately-priced maintenance service contracts which qualify as service-type warranties and represent separate performance obligations. We do not allow and have no history of accepting product returns.

Customer support includes software updates on a when-and-if-available basis, telephone support, integrated web-based support and bug fixes or patches. We sell our customer support contracts at a percentage of list or net product price related to the support. Customer support revenue is recognized ratably over the term of the customer support agreement, which is typically one year.

Our professional services include consulting, technical support, resident engineer services, design services and installation services. Because control transfers over time, revenue is recognized based on progress toward completion of the performance obligation. The method to measure progress toward completion requires judgment and is based on the nature of the products or services to be provided. We generally use the input method to measure progress for our contracts because we believe it best depicts the transfer of assets to the customer which occurs as we incur costs for the contracts. However, in some instances, we use the output method because it best depicts the transfer of asset to the customer. Under the cost-to-cost measure of progress, the progress toward completion is measured based on the ratio of costs incurred to date to the total estimated costs at completion of the performance obligation. When the measure of progress is based upon expended labor, progress toward completion is measured as the ratio of labor time expended to date versus the total estimated labor time required to complete the performance obligation. Revenue is recorded proportionally as costs are incurred or as labor is expended. Costs to fulfill these obligations include internal labor as well as subcontractor costs.

We offer customer training courses, for which the related revenue is typically recognized as the training services are performed.

Our contracts with customers often include promises to transfer multiple products and services to the customer. Determining whether products and services are considered distinct performance obligations that should be accounted for separately versus together may require significant judgment.

Judgment is required to determine the SSP for each distinct performance obligation. In instances where SSP is not directly observable, such as when we do not sell the product or service separately, we determine the SSP using information that may include market conditions and other observable inputs. We typically have more than one SSP for individual products and services due to the stratification of those products and services by customers and circumstances. In these instances, the Company may use information such as the size of the customer and geographic region in determining the SSP.

Valuation of Inventory. We review inventory for both potential obsolescence and potential loss of value periodically. In this review, we make assumptions about the future demand for and market value of the inventory and, based on these assumptions, estimate the amount of any excess, obsolete or slow-moving inventory.

We write down our inventories if they are considered to be obsolete or at levels in excess of forecasted demand. In these cases, inventory is written down to estimated realizable value based on historical usage and expected demand. Inherent in our estimates of market value in determining inventory valuation are estimates related to economic trends, future demand for our products and technical obsolescence of our products. If future demand or market conditions are less favorable than our projections, additional inventory write-downs could be required and would be reflected in the cost of revenue in the period the revision is made. To date, we have not been required to revise any of our assumptions or estimates used in determining our inventory valuations.

We write down our evaluation equipment at the time of shipment to our customers, as it is not probable that the inventory value will be realizable.

Debentures and Warrants. We have Debentures and Warrants that we received as sale consideration in connection with the Kandy Sale, which we account for in accordance with Accounting Standards Codification ("ASC") 820, *Fair Value Measurement* ("ASC 820)".

We calculate the fair value of the Debentures using a Lattice-based valuation approach, which utilizes a binomial tree to model the different paths the price of AVCT's common stock might take over the Debentures' life by using assumptions regarding the stock price volatility and risk-free interest rate. These results are then used to calculate the fair value of the Debentures at each measurement date. We use the Black-Scholes valuation model for estimating the fair value of the Warrants at each measurement date. The fair value of the Warrants is affected by AVCT's stock price as well as valuation assumptions, including the volatility of AVCT's stock price, expected term of the option, risk-free interest rate and expected dividends. Both the Lattice and Black-Scholes valuation models are based on available market data, giving consideration to all of the rights and obligations of each instrument and precluding the use of "blockage" discounts or premiums in determining the fair value of a large block of financial instruments.

We are calculating the fair value of the Debentures and Warrants at each quarter-end and recording any adjustments to the fair values in Other income (expense), net. The fair values of the Debentures and Warrants are reported as Investments in our consolidated balance sheet at December 31, 2020.

Warranty Accruals. We record warranty liabilities for estimated costs of fulfilling our obligations under standard limited hardware and software warranties at the time of sale. The liability for standard warranties is included in Accrued expenses and other and Other long-term liabilities in our consolidated balance sheet. The specific warranty terms and conditions vary depending upon the country in which we do business, but generally include material costs, technical support, labor and associated overhead over a period ranging from one to three years. We provide for the estimated costs to fulfill customer warranty obligations for certain of our products upon recognition of the related revenue. Warranty is included as a component of Cost of revenue in our consolidated statements of operations, and is determined based on actual warranty cost experience, estimates of component failure rates and our management's industry experience. Our sales contracts do not permit the right of return of the product by the customer after the product has been accepted.

Loss Contingencies and Reserves. We are subject to ongoing business risks arising in the ordinary course of business that affect the estimation process of the carrying value of assets, the recording of liabilities and the possibility of various loss contingencies. An estimated loss contingency is accrued when it is probable that a liability has been incurred or an asset has been impaired and the amount of loss can be reasonably estimated. We regularly evaluate current information available to determine whether such amounts should be adjusted and record changes in estimates in the period they become known. We are subject to various legal claims. We reserve for legal contingencies and legal fees when the amounts are probable and reasonably estimable.

Stock-Based Compensation. Our stock-based compensation cost is measured at the grant date based on the fair value of the award and is recognized as expense over the requisite service period, which is generally the vesting period.

We use the Black-Scholes valuation model for estimating the fair value on the date of grant of employee stock options. Determining the fair value of stock option awards at the grant date requires judgment regarding certain valuation assumptions, including the volatility of our stock price, expected term of the option, risk-free interest rate and expected dividends. Changes in such assumptions and estimates could result in different fair values and could therefore impact our earnings. Such changes, however, would not impact our cash flows. The fair value of restricted stock awards, restricted stock units and performance-based awards is based upon our stock price on the grant date.

We grant performance-based stock units, some of which include a market condition, to certain of our executives. We use a Monte Carlo simulation approach to model future stock price movements based upon the risk-free rate of return, the volatility of each entity, and the pair-wise covariance between each entity. These results are then used to calculate the grant date fair values of the performance-based stock units.

The amount of stock-based compensation expense recorded in any period for unvested awards requires estimates of the amount of stock-based awards that are expected to be forfeited prior to vesting, as well as assumptions regarding the probability that performance-based stock awards without market conditions will be earned.

Business Combinations. We allocate the purchase price of acquired companies to identifiable assets acquired and liabilities assumed at their acquisition date fair values. Goodwill as of the acquisition date is measured as the excess of consideration transferred over the net of the acquisition date fair values of the assets acquired and the liabilities assumed and represents the expected future economic benefits arising from other assets acquired in the business combination that are not

individually identified and separately recognized. Significant management judgments and assumptions are required in determining the fair value of assets acquired and liabilities assumed, particularly acquired intangible assets which are principally based upon estimates of the future performance and cash flows expected from the acquired business and applied discount rates. While we use our best estimates and assumptions as part of the purchase price allocation process to accurately value assets acquired and liabilities assumed at a business combination date, our estimates and assumptions are inherently uncertain and subject to refinement. If different assumptions are used, it could materially impact the purchase price allocation and our financial position and results of operations. Any adjustments to assets acquired or liabilities assumed subsequent to the purchase price allocation period are included in operating results in the period in which the adjustments are determined. Intangible assets typically are comprised of in-process research and development, developed technology, customer relationships, trade names and internal use software.

Goodwill and Intangible Assets. Goodwill is not amortized, but instead is tested for impairment annually, or more frequently if indicators of potential impairment exist. Intangible assets with estimated lives and other long-lived assets are reviewed for impairment when events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of intangible assets with estimated lives and other long-lived assets is measured by comparing the carrying amount of the asset to future net undiscounted pretax cash flows expected to be generated by the asset. If these comparisons indicate that an asset is not recoverable, we will recognize an impairment loss for the amount by which the carrying value of the asset exceeds the related estimated fair value.

Judgment is required in determining whether an event has occurred that may impair the value of goodwill, identifiable intangible assets or other long-lived assets. Factors that could indicate an impairment may exist include significant underperformance relative to plan or long-term projections, strategic changes in business strategy, significant negative industry or economic trends, a significant change in circumstances relative to a large customer, a significant decline in our stock price for a sustained period and a decline in our market capitalization to below net book value. We must make assumptions about future control premiums, market comparables, cash flows, operating plans, discount rates and other factors to determine recoverability.

Prior to 2020, our annual test for impairment of goodwill was completed as of November 30. Effective in 2020, we changed our annual goodwill impairment test date from November 30 to October 1. This change did not have a material impact on our consolidated financial statements.

As described above, effective in the fourth quarter of 2020, we determined that we had two operating segments: Cloud and Edge, and IP Optical Networks. For the purpose of testing goodwill for impairment, all goodwill is assigned to a reporting unit, which may be either an operating segment or a portion of an operating segment. We determined that the goodwill assigned to the Cloud and Edge reporting unit was $225 million and the goodwill assigned to the IP Optical Networks reporting unit was $192 million. We perform a fair value analysis using both an Income and Market approach, which encompasses a discounted cash flow analysis and a guideline public company analysis using selected multiples. We assess each valuation methodology based upon the relevance and availability of the data at the time the valuation is performed and the methodologies are weighted appropriately. Upon completion of our 2020 annual test for goodwill impairment, we determined that there was no impairment of goodwill for either of our reporting units.

We previously operated as a single operating segment with one reporting unit and consequently we evaluated goodwill for impairment based on an evaluation of the fair value of the Company as a whole. Based on the results of our 2019 annual impairment test, we determined that our carrying value exceeded our fair value. We performed a fair value analysis using both an income and market approach as described above. We determined that the amount of the impairment was $164 million and recorded an impairment charge in the fourth quarter of 2019. The impairment charge is reported separately in our consolidated statement of operations for the year ended December 31, 2019.

Leases. We account for our leases in accordance with Accounting Standards Codification ("ASC") 842, *Leases* ("ASC 842"), which we adopted effective January 1, 2019 using the alternative transition method, which allowed entities to initially apply ASC 842 at the adoption date with no adjustments to prior period lease costs for comparability. We have operating and finance leases for corporate offices, research and development facilities, and certain equipment. Operating leases are reported separately in our consolidated balance sheets at December 31, 2020 and 2019. Assets acquired under finance leases are included in Property and equipment, net, in our consolidated balance sheets at December 31, 2020 and 2019.

We determine if an arrangement is a lease at inception. A contract is determined to contain a lease component if the arrangement provides us with a right to control the use of an identified asset. Lease agreements may include lease and non-lease components. In such instances for all classes of underlying assets, we do not separate lease and non-lease components but rather, account for the entire arrangement under leasing guidance. Leases with an initial term of 12 months or less are not

recorded on the balance sheet and lease expense for these leases is recognized on a straight-line basis over the lease term.

For operating leases, lease expense for minimum fixed lease payments is recognized on a straight-line basis over the lease term. The expense for finance leases includes both interest and amortization expense components, with the interest component calculated based on the effective interest method and the amortization component calculated based on straight-line amortization of the right-of-use asset over the lease term. Lease contracts may contain variable lease costs, such as common area maintenance, utilities and tax reimbursements that vary over the term of the contract. Variable lease costs are not included in minimum fixed lease payments and as a result, are excluded from the measurement of the right-of-use assets and lease liabilities. We expense all variable lease costs as incurred.

Accounting for Income Taxes. Our provision for income taxes is comprised of a current and a deferred portion. The current income tax provision is calculated as the estimated taxes payable or refundable on tax returns for 2020. We provide for deferred income taxes resulting from temporary differences between financial and taxable income. Such differences arise primarily from tax net operating loss ("NOL") and credit carryforwards, depreciation, deferred revenue, stock-based compensation expense, accruals and reserves.

We assess the recoverability of any tax assets recorded on the balance sheet and provide any necessary valuation allowances as required. In evaluating our ability to recover our deferred tax assets, we consider all available positive and negative evidence, including our past operating results, the existence of cumulative income in the most recent years, changes in the business in which we operate and our forecast of future taxable income. In determining future taxable income, we make assumptions, including the amount of state, federal and international pre-tax operating income, the reversal of temporary differences and the implementation of feasible and prudent tax planning strategies. These assumptions require significant judgment about the forecasts of future taxable income and are consistent with the plans and estimates we are using to manage our underlying businesses. Such assessment is completed on a jurisdiction-by-jurisdiction basis.

At December 31, 2020, we had valuation allowances of $496 million to offset deferred tax assets of $582 million. These valuation allowances mainly relate to our U.S. and Israel operations. In the event we determine it is more likely than not that we will be able to use a deferred tax asset in the future in excess of its net carrying value, the valuation allowance would be reduced, thereby increasing net earnings and increasing equity in the period such determination is made. We have recorded net deferred tax assets in some of our other international subsidiaries. These amounts could change in future periods based upon our operating results and changes in tax law.

We provide for income taxes during interim periods based on the estimated effective tax rate for the full year. We record a cumulative adjustment to the tax provision in an interim period in which a change in the estimated annual effective tax rate is determined.

We have provided for income taxes on the undistributed earnings of our non-U.S. subsidiaries as of December 31, 2020, excluding Ireland and Israel. These subsidiaries, excluding Ireland and Israel, are cost-plus or limited risk distributors that are not anticipated to need to use excess funds locally. Accordingly, we are required to recognize and book deferred taxes for 2020. The deferred taxes are booked on the entire outside basis differences related to the foreign subsidiaries, the largest of these differences being undistributed earnings. At December 31, 2020, Ribbon had a deferred tax liability of $15.7 million related to withholding taxes in various countries.

We assess all material positions taken in any income tax return, including all significant uncertain positions, in all tax years that are still subject to assessment or challenge by relevant taxing authorities. Assessing an uncertain tax position begins with the initial determination of the position's sustainability and is measured at the largest amount of benefit that has a greater than 50% likelihood of being realized upon ultimate settlement. As of each balance sheet date, unresolved uncertain tax positions must be reassessed, and we determine whether (i) the factors underlying the sustainability assertion have changed and (ii) the amount of recognized tax benefit is still appropriate. The recognition and measurement of tax benefits require significant judgment. Judgments concerning the recognition and measurement of a tax benefit might change as new information becomes available.

Results of Operations

Years Ended December 31, 2020 and 2019

Revenue. Revenue for the years ended December 31, 2020 and 2019 was as follows (in thousands, except percentages):

	Year ended December 31,		Increase from prior year	
	2020	2019	$	%
Product	$ 467,912	$ 262,030	$ 205,882	78.6 %
Service	375,883	301,081	74,802	24.8 %
Total revenue	$ 843,795	$ 563,111	$ 280,684	49.8 %

Segment revenue for the years ended December 31, 2020 and 2019 was as follows (in thousands):

	Year ended December 31, 2020			Year ended December 31, 2019		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Product	$ 275,445	$ 192,467	$ 467,912	$ 262,030	$ —	$ 262,030
Service	307,825	68,058	375,883	301,081	—	301,081
Total revenue	$ 583,270	$ 260,525	$ 843,795	$ 563,111	$ —	$ 563,111

The increase in our product revenue in 2020 compared to 2019 was primarily the result of the inclusion of $192 million of product revenue attributable to our IP Optical Networks segment in the current year since the ECI Acquisition Date, coupled with $13 million of higher sales in 2020 of our Cloud and Edge products compared to 2019. The increase in sales of our Cloud and Edge products in the current year was primarily attributable to higher sales of certain of our SBC products (i.e., our SBC 5000 series products and SBC 7000 products), partially offset by lower sales of our EdgeMarc products.

In 2020, 30% of our product revenue was attributable to sales to enterprise customers, compared to 27% in 2019. These sales were made through both our direct sales team and indirect sales channel partners. In 2020, 29% of our product revenue was from indirect sales through our channel partner program, compared to 36% in 2019.

The timing of the completion of customer projects and revenue recognition criteria satisfaction may cause our product revenue to fluctuate from one period to the next.

Service revenue is primarily comprised of software and hardware maintenance and support (“maintenance revenue”) and network design, installation and other professional services (“professional services revenue”).

Service revenue for the years ended December 31, 2020 and 2019 was comprised of the following (in thousands, except percentages):

	Year ended December 31,		Increase from prior year	
	2020	2019	$	%
Maintenance	$ 274,816	$ 234,228	$ 40,588	17.3 %
Professional services	101,067	66,853	34,214	51.2 %
Total service revenue	$ 375,883	$ 301,081	$ 74,802	24.8 %

Segment service revenue for the years ended December 31, 2020 and 2019 was comprised of the following (in thousands):

	Year ended December 31, 2020			Year ended December 31, 2019		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Maintenance	$ 229,035	$ 45,781	$ 274,816	$ 234,228	$ —	$ 234,228
Professional services	78,790	22,277	101,067	66,853	—	66,853
Total service revenue	$ 307,825	$ 68,058	$ 375,883	$ 301,081	$ —	$ 301,081

The increase in maintenance revenue was primarily attributable to the inclusion of $46 million of revenue from IP Optical Networks in the 2020 period from the ECI Acquisition Date, partially offset by a slight decrease in maintenance revenue attributable to Cloud and Edge. The increase in professional services revenue was attributable to the inclusion of $22 million of

revenue from IP Optical Networks in the 2020 period from the ECI Acquisition Date, coupled with $12 million of higher revenue from Cloud and Edge professional services primarily related to Network Transformation and SBC deployments.

The following customers contributed 10% or more of our revenue in the years ended December 31, 2020 and 2019:

	Year ended December 31,	
	2020	2019
Verizon Communications Inc.	15%	17%
AT&T Inc.	*	12%

* Less than 10% of total revenue.

Revenue earned from customers domiciled outside the United States was 55% of revenue in 2020 and 39% of revenue in 2019. Due to the timing of project completions, we expect that the domestic and international components as a percentage of our revenue may fluctuate from quarter to quarter and year to year. Our total revenue for the years ended December 31, 2020 and 2019 was disaggregated geographically as follows (in thousands):

Year ended December 31, 2020	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 201,347	$ 132,661	$ 48,611	$ 382,619
Europe, Middle East and Africa	149,567	73,475	25,226	248,268
Asia Pacific	90,201	36,628	19,627	146,456
Other	26,797	32,052	7,603	66,452
	$ 467,912	$ 274,816	$ 101,067	$ 843,795

Year ended December 31, 2019	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 170,937	$ 133,271	$ 37,085	$ 341,293
Europe, Middle East and Africa	42,262	43,186	12,279	97,727
Asia Pacific	30,617	27,798	10,721	69,136
Other	18,214	29,973	6,768	54,955
	$ 262,030	$ 234,228	$ 66,853	$ 563,111

Our deferred product revenue was $8 million at December 31, 2020 and $5 million at December 31, 2019. Our deferred service revenue was $115 million at December 31, 2020 and $116 million at December 31, 2019. Our deferred revenue balance may fluctuate as a result of the timing of revenue recognition, customer payments, maintenance contract renewals, contractual billing rights and maintenance revenue deferrals included in multiple element arrangements.

We expect that our total revenue in 2021 will increase as compared to our 2020 total revenue as our strategy to grow our IP Optical market share in North America gains momentum and capital spending in India recovers to 2019 levels.

Cost of Revenue/Gross Margin. Our cost of revenue consists primarily of amounts paid to third-party manufacturers for purchased materials and services, royalties, inventory valuation adjustments, warranty costs, and manufacturing and services personnel and related costs. Our cost of revenue and gross margins for the years ended December 31, 2020 and 2019 were as follows (in thousands, except percentages):

	Year ended December 31,		Increase from prior year	
	2020	2019	$	%
Cost of revenue				
Product	$ 204,772	$ 95,774	$ 108,998	113.8 %
Service	$ 145,916	$ 112,680	33,236	29.5 %
Total cost of revenue	$ 350,688	$ 208,454	$ 142,234	68.2 %

Gross margin		
Product	56.2 %	63.4 %
Service	61.2 %	62.6 %
Total gross margin	58.4 %	63.0 %

Our segment cost of revenue and gross margins for the years ended December 31, 2020 and 2019 were as follows (in thousands, except percentages):

	Year ended December 31, 2020			Year ended December 31, 2019		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Product	$ 89,883	$ 114,889	$ 204,772	$ 95,774	$ —	$ 95,774
Service	108,985	36,931	145,916	112,680	—	112,680
Total cost of revenue	$ 198,868	$ 151,820	$ 350,688	$ 208,454	$ —	$ 208,454

	Year ended December 31, 2020			Year ended December 31, 2019		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Gross margin						
Product	67.4 %	40.3 %	56.2 %	63.4 %	— %	63.4 %
Service	64.6 %	45.7 %	61.2 %	62.6 %	— %	62.6 %
Total gross margin	65.9 %	41.7 %	58.4 %	63.0 %	— %	63.0 %

The decrease in our product gross margin in 2020 compared to 2019 was primarily due to the inclusion of IP Optical Networks products from the ECI Acquisition, which include a higher hardware component. The increase in our Cloud and Edge product gross margin in 2020 compared to 2019 was primarily attributable to higher software sales in 2020.

The decrease in our service gross margin in 2020 compared to 2019 was primarily due to the inclusion in 2020 of IP Optical Networks' historically lower service gross margin, partially offset by the increase in our Cloud and Edge service gross margin in 2020 compared to 2019, which was primarily due to our recent cost reduction and restructuring initiatives.

We believe that our total gross margin will decrease slightly in 2021 compared to 2020, primarily due to higher expected sales from IP Optical Networks, which have historically lower margins due to the higher hardware content in their products.

Research and Development. Research and development ("R&D") expenses consist primarily of salaries and related personnel expenses and prototype costs for the design, development, testing and enhancement of our products. Research and development expenses for the years ended December 31, 2020 and 2019 were as follows (in thousands, except percentages):

Year ended December 31,		Increase from prior year	
2020	2019	$	%
$ 194,525	$ 141,060	$ 53,465	37.9 %

The increase in R&D expenses in 2020 compared to 2019 was primarily attributable to the inclusion of IP Optical Networks' R&D expenses in the current year for the period since the ECI Acquisition, which added $62 million in R&D operating expenses, principally employee- and infrastructure-related costs. This increase was partially offset by $9 million of lower costs in our Cloud and Edge segment, primarily employee- and infrastructure-related, arising from our previous cost reduction and restructuring initiatives.

Some aspects of our R&D efforts require significant short-term expenditures, the timing of which may cause significant variability in our expenses. We believe that rapid technological innovation is critical to our long-term success, and we are tailoring our investments to meet the requirements of our customers and market. We believe that our R&D in 2021 will increase compared to 2020, primarily due to incremental investment in our IP Optical Networks segment to address the global market opportunity.

Sales and Marketing. Sales and marketing expenses consist primarily of salaries and related personnel costs, commissions, travel and entertainment expenses, promotions, customer trial and evaluations inventory and other marketing and

sales support expenses. Sales and marketing expenses for the years ended December 31, 2020 and 2019 were as follows (in thousands, except percentages):

Year ended December 31,		Increase from prior year	
2020	2019	$	%
$ 139,318	$ 106,310	$ 33,008	31.0 %

The increase in sales and marketing expenses in 2020 compared to 2019 was primarily attributable to the inclusion of IP Optical Networks' sales and marketing expenses in the current year for the period since the ECI Acquisition, which added $43 million in sales and marketing expenses, principally employee- and infrastructure-related costs. This increase was partially offset by $10 million of lower costs in our Cloud and Edge segment, primarily employee- and infrastructure-related, arising from our previous cost reduction and restructuring initiatives.

We believe that our sales and marketing expenses will increase modestly in 2021 compared with 2020, primarily due to higher employee-related expenses and higher costs, assuming COVID-19 restrictions begin to ease.

General and Administrative. General and administrative expenses consist primarily of salaries and related personnel costs for executive and administrative personnel, and audit, legal and other professional fees. General and administrative expenses for the years ended December 31, 2020 and 2019 were as follows (in thousands, except percentages):

Year ended December 31,		Increase from prior year	
2020	2019	$	%
$ 63,286	$ 53,870	$ 9,416	17.5 %

The increase in general and administrative expenses in 2020 compared to 2019 was primarily attributable to the inclusion of IP Optical Networks' general and administrative expenses in the current year for the period since the ECI Acquisition, which added $17 million in general and administrative expenses, principally employee-related expenses. This increase was partially offset by $8 million of lower costs in our Cloud and Edge segment, primarily legal fees and employee-related expenses.

We believe that our general and administrative expenses in 2021 will be consistent with our 2020 levels, and decline in future years as we realize additional integration synergies.

Amortization of Acquired Intangible Assets. Amortization of acquired intangible assets for the years ended December 31, 2020 and 2019 was as follows (in thousands, except percentages):

Year ended December 31,		Increase from prior year	
2020	2019	$	%
$ 60,910	$ 49,225	$ 11,685	23.7 %

The increase in 2020 amortization of acquired intangible assets compared to 2019 was primarily due to expense related to the intangible assets arising from the ECI Acquisition. Amortization of acquired intangible assets is reported separately in the consolidated statements of operations.

Impairment of Goodwill. Prior to 2020, our annual test for impairment of goodwill was completed as of November 30. Effective in 2020, we changed our annual goodwill impairment test date from November 30 to October 1. This change did not have a material impact on our consolidated financial statements. Our annual test for impairment in 2020 did not result in an impairment for either of our two reporting units.

We previously operated as a single operating segment with one reporting unit and consequently evaluated goodwill for impairment based on an evaluation of the fair value of the Company as a whole. Based on the results of our 2019 annual impairment test, we determined that our carrying value exceeded our fair value and accordingly, we recorded an impairment charge of $164 million in 2019. Impairment of goodwill is reported separately in the consolidated statements of operations.

Acquisition-, Disposal- and Integration-Related. Acquisition-, disposal- and integration-related expenses include those expenses related to acquisitions that we would otherwise not have incurred. Acquisition- and disposal-related expenses include professional and services fees, such as legal, audit, consulting, paying agent and other fees. Integration-related expenses

represent incremental costs related to combining the Company's systems and processes with those of acquired businesses, such as third-party consulting and other third-party services.

We recorded $17 million of acquisition-, disposal- and integration-related expenses in 2020, comprised of $13 million of acquisition-related expenses, $2 million of disposal-related expenses and $2 million of integration-related expenses. The acquisition-related expenses primarily related to the ECI Acquisition and, to a lesser extent, other acquisition-related activities. The disposal-related expenses related to the Kandy Sale. The integration-related expenses related to our ongoing integration activities, primarily related to the ECI Acquisition.

We recorded $13 million of acquisition-, disposal and integration-related expenses in 2019, comprised of $9 million of acquisition-related expenses and $4 million of integration-related expenses. The acquisition-related expenses primarily related to the then-pending ECI Acquisition and, to a lesser extent, the Anova Acquisition and other acquisition-related activities. The integration-related expenses related to our ongoing integration activities, primarily related to the GENBAND Merger.

Acquisition-, disposal- and integration-related expenses are reported separately in the consolidated statements of operations.

Restructuring and Related. We have been committed to streamlining operations and reducing operating costs by closing and consolidating certain facilities and reducing our worldwide workforce. Please see the additional discussion of our restructuring initiatives in the "Restructuring and Cost Reduction Initiatives" section of the Overview of this Management's Discussion and Analysis of Financial Condition and Results of Operations.

We recorded restructuring and related expense of $16 million in 2020, comprised of $12 million for severance and related costs, and $4 million for variable and other facilities-related costs, including accelerated amortization of lease assets. We recorded $16 million of restructuring and related expense in 2019, comprised of $11 million for severance and related costs, $1 million for variable and other facilities-related costs and $4 million for accelerated amortization of lease assets.

Although we have eliminated positions as part of our restructuring initiatives, we continue to hire in certain areas that we believe are important to our future growth. Restructuring and related expense is reported separately in the consolidated statements of operations.

Interest (Expense) Income, net. Interest expense and interest income for the years ended December 31, 2020 and 2019 were as follows (in millions, except percentages):

	Year ended December 31,		Increase (decrease) from prior year	
	2020	2019	$	%
Interest income	$ 471	$ 573	$ (102)	(17.8)%
Interest expense	(21,513)	(4,450)	17,063	383.4 %
	$ (21,042)	$ (3,877)	$ (17,165)	442.7 %

Interest income in 2020 primarily represents interest earned on the outstanding note receivable from Metaswitch, which was paid in full in the third quarter of 2020. Interest expense in 2020 was primarily comprised of $14.4 million of interest on our outstanding term debt, and $4.2 million in the aggregate related to amortization of debt issuance costs, interest on other borrowings and finance leases, and interest expense in connection with the factoring of certain accounts receivable. Interest expense in 2020 also included the write-off of $2.9 million of debt issuance costs in connection with the amendment of the 2020 Credit Facility and the retirement of the 2019 Credit Facility (as defined below).

Interest income in 2019 was primarily earned from an outstanding $25.5 million three-year note receivable bearing interest at 4%. Interest expense in 2019 primarily related to revolver and term borrowings and the promissory note issued to certain of GENBAND's equityholders in connection with the GENBAND Merger.

Other Income (Expense), Net. We recorded other income, net aggregating $113 million in 2020, primarily in connection with the Kandy Sale, which was comprised of $83.6 million from the gain on the sale, and $30.3 million related to the increase in the fair value of the Debentures and Warrants from the Kandy Sale Date through December 31, 2020. We recorded a gain of $63.0 million from the settlement of litigation with Metaswitch in 2019 and a gain of $8.1 million from the reduction of deferred purchase consideration in connection with the Edgewater Acquisition. These gains were the primary components of our Other income (expense), net, in 2020 and 2019 and were partially offset primarily by expense related to foreign currency translation.

Income Tax Provision. We recorded income tax provisions of $4.7 million in 2020 and $7.2 million in 2019. The provision recorded in 2020 was primarily the result of the gain from the Kandy Sale and foreign operations. The provision recorded in 2019 was primarily the result of foreign operations.

During 2020 and 2019, we performed an analysis to determine if, based on all available evidence, we considered it more likely than not that some portion or all of the recorded deferred tax assets will not be realized in a future period. As a result of our evaluations, we concluded that there was insufficient positive evidence to overcome the more objective negative evidence related to our cumulative losses and other factors. Accordingly, we maintained a valuation mainly against our U.S. and Israel deferred tax assets. A similar analysis and conclusion was made with regard to the valuation allowance on the deferred tax assets of our foreign subsidiaries. The Ireland subsidiary's business model changed in 2020 to a limited risk distributor. As a result, the decision was made to release a portion of the valuation allowance because of the future income. The valuation allowance for the capital loss carryforward will remain, since there are no current plans to generate capital gains.

Off-Balance Sheet Arrangements

We have no off-balance sheet arrangements that have or are reasonably likely to have a current or future material effect on our financial position, changes in financial position, revenue or expenses, results of operations, liquidity, capital expenditures or capital resources.

Liquidity and Capital Resources

Our consolidated statements of cash flows are summarized as follows (in thousands):

	Year ended December 31,		
	2020	2019	Change
Net income (loss)	$ 88,591	$ (130,075)	$ 218,666
Adjustments to reconcile net income (loss) to cash flows provided by operating activities	(17,903)	236,700	(254,603)
Changes in operating assets and liabilities	30,876	(50,940)	81,816
Net cash provided by operating activities	$ 101,564	$ 55,685	$ 45,879
Net cash used in investing activities	$ (330,073)	$ (3,529)	$ (326,544)
Net cash provided by (used in) financing activities	$ 319,303	$ (51,277)	$ 370,580

We had cash and restricted cash aggregating $136 million at December 31, 2020, and $45 million of cash at December 31, 2019. We had cash held by our non-U.S. subsidiaries aggregating $46 million at December 31, 2020 and $12 million at December 31, 2019. If we elect to repatriate all of the funds held by our non-U.S. subsidiaries as of December 31, 2020, we do not believe that the amounts of potential withholding taxes that would arise from the repatriation would have a material effect on our liquidity.

On April 29, 2019, we, as guarantor, and Ribbon Communications Operating Company, Inc., as borrower, entered into a syndicated, amended and restated credit facility (the "2019 Credit Facility"), which replaced our previous credit facility, which we had entered into in 2018. The 2019 Credit Facility provided for a $50 million term loan facility that was advanced in full on April 29, 2019, and a $100 million revolving line of credit. At December 31, 2019, we had an outstanding term loan debt balance of $49 million and an outstanding revolving line of credit balance of $8 million with a combined average interest rate of 3.30%, and $5 million of outstanding letters of credit at an interest rate of 1.50%.

The indebtedness and other obligations under the 2019 Credit Facility were unconditionally guaranteed on a senior secured basis by the Company and each other material U.S. domestic subsidiary of the Company (collectively, the "Guarantors"). The 2019 Credit Facility was secured by first-priority liens on substantially all of the assets of the Borrower and the Guarantors, including the Company.

The 2019 Credit Facility required periodic interest payments on any outstanding borrowings under the facility. The Borrower could repay all revolving loans under the 2019 Credit Facility at any time without premium or penalty (other than customer LIBOR breakage costs), subject to certain notice requirements.

Revolving loans under the 2019 Credit Facility bore interest at our option at either the Eurodollar ("LIBOR") rate plus a margin ranging from 1.50% to 3.00% per year or the base rate (the highest of the Federal Funds rate plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal) plus a margin ranging from 0.50% to 2.00% per year (such margins being referred to as the “Applicable Margin”). The Applicable Margin varied depending on our consolidated leverage ratio (as defined in the 2019 Credit Facility). The base rate and the LIBOR rate were each subject to a zero percent floor.

The 2019 Credit Facility required compliance with certain financial covenants, including a minimum consolidated quick ratio, minimum consolidated fixed charge coverage ratio and maximum consolidated leverage ratio, all of which were defined in the 2019 Credit Facility and tested on a quarterly basis. We were in compliance with all covenants of the 2019 Credit Facility at December 31, 2019.

On March 3, 2020, we entered into the 2020 Credit Facility, by and among us, as a guarantor, Ribbon Communications Operating Company, Inc., as the borrower ("Borrower"), Citizens Bank, N.A. ("Citizens"), as administrative agent, a lender, issuing lender, swingline lender, joint lead arranger and bookrunner, Santander Bank, N.A., as a lender, joint lead arranger and bookrunner, and the other lenders party thereto (each, together with Citizens Bank, N.A. and Santander Bank, N.A., referred to individually as a "Lender", and collectively, the "Lenders"). The proceeds from the 2020 Credit Facility were used, in part, to pay off in full all obligations of the Company under the 2019 Credit Facility.

The 2020 Credit Facility provides for $500 million of commitments from the lenders to the Borrower, comprised of $400 million in term loans (the "2020 Term Loan Facility") and a $100 million facility available for revolving loans (the "2020 Revolving Credit Facility"). Under the 2020 Revolving Credit Facility, a $30 million sublimit is available for letters of credit and a $20 million sublimit is available for swingline loans. Under the 2020 Credit Facility, we were originally required to make quarterly principal payments aggregating approximately $10 million in the first year, $20 million per year for the following three years and $30 million in the last year, with the remaining balance due on the maturity date.

The indebtedness and other obligations under the 2020 Credit Facility are unconditionally guaranteed on a senior secured basis by the Company, Edgewater Networks, Inc., a wholly-owned subsidiary of the Company, and GENBAND Inc., a wholly-owned subsidiary of the Company (together, the "Guarantors"). The 2020 Credit Facility is secured by first-priority liens on substantially all of the assets of the Borrower and the Guarantors, including substantially all of the assets of the Company.

The 2020 Credit Facility requires compliance with certain financial covenants, including a minimum Consolidated Fixed Charge Coverage Ratio and a maximum Consolidated Net Leverage Ratio (each as defined in the 2020 Credit Agreement, and each tested on a quarterly basis).

In addition, the 2020 Credit Facility contains various covenants that, among other restrictions, limit our and our subsidiaries’ ability to incur or assume indebtedness; grant or assume liens; make acquisitions or engage in mergers; sell, transfer, assign or convey assets; repurchase equity and make dividend and certain other restricted payments; make investments; engage in transactions with affiliates; enter into sale and leaseback transactions; enter into burdensome agreements; change the nature of its business; modify their organizational documents; or amend or make prepayments on certain junior debt.

The 2020 Credit Facility contains events of default that are customary for a secured credit facility. If an event of default relating to bankruptcy or other insolvency events with respect to the Company or any of its subsidiaries occurs, all obligations under the 2020 Credit Facility will immediately become due and payable. If any other event of default exists under the 2020 Credit Facility, the lenders can accelerate the maturity of the obligations outstanding under the 2020 Credit Facility and exercise other rights and remedies, including charging a default rate of interest equal to 2.00% per year above the rate that would otherwise be applicable. In addition, if any event of default exists under the 2020 Credit Facility, the lenders can commence foreclosure or other actions against the collateral.

On August 18, 2020 (the "First Amendment Effective Date"), we entered into the First Amendment to the 2020 Credit Facility. Pursuant to an assignment and assumption agreement entered into by Citizens and certain affiliates of Whitehorse Capital on the First Amendment Effective Date (collectively, "HIG Whitehorse"), and consented to by Citizens and the Borrower, $75 million of the 2020 Term Loan Facility, designated as the Term B Loan (the "Term B Loan") was assigned from Citizens to HIG Whitehorse. The remaining $325 million of the 2020 Term Loan Facility that was not assigned to HIG Whitehorse was deemed the Term A Loan (the "Term A Loan" and, together with the Term B Loan, the "Amended 2020 Term Loan Facility").

The Term A Loan and amounts under the 2020 Revolving Credit Facility mature in March 2025. The Term A Loan and 2020 Revolving Credit Facility bear interest at the Borrower's option at either the LIBOR rate plus a margin ranging from 1.50% to 3.50% per year, or the base rate (the highest of the Federal Funds Effective Rate (as defined in the 2020 Credit

Agreement) plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal) plus a margin ranging from 0.50% to 2.50% per year (the "Applicable Margin"). The Applicable Margin varies depending on our Consolidated Net Leverage Ratio (as defined in the 2020 Credit Agreement). The base rate and the LIBOR rate are each subject to a zero percent floor. We are required to make quarterly principal payments on the Term A Loan aggregating approximately $10 million in the first year, $16 million in each of the next two years, $20 million in the fourth year and $16 million in the last year, with the final payment approximating $244 million due on the maturity date. The Borrower can prepay all amounts under the Term A Loan and the 2020 Revolving Credit Facility at any time without premium or penalty (other than customary LIBOR breakage costs), subject to certain notice requirements. The First Amendment did not change the terms applied to the Term A Loan or the Revolving Credit Facility under the 2020 Credit Facility.

The Term B Loan is scheduled to mature in March 2026 and bears interest, at the Borrower's option, at either the LIBOR rate plus a margin of 7.50% per year, or the base rate (the highest of the Federal Funds Effective Rate (as defined in the 2020 Credit Facility) plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal, plus a margin of 6.50% per year. The Term B Loan has a lower rate of amortization than the Term A Loan and is subject to a 1.0% premium if voluntarily repaid in connection with a repricing transaction (as defined in the First Amendment) occurring prior to the six month anniversary of the First Amendment Effective Date. We are required to make quarterly principal payments totaling approximately $1 million in the first year and $8 million in the aggregate over the next four and a half years, with the final payment approximating $66 million due on the maturity date.

The First Amendment reduced the Borrower's ability to incur new tranches of term loans, or increases in commitments under the Amended 2020 Term Loan Facility or the 2020 Revolving Credit Facility. Specifically, such indebtedness can be incurred up to an aggregate dollar amount equal to 75% of the Company's Consolidated Adjusted EBITDA (as defined in the 2020 Credit Facility), reduced from 100% prior to the First Amendment, as of the most recently ended fiscal quarter for which financial statements have been delivered to the lenders, plus additional amounts, so long as the Borrower's Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility) does not exceed 2.25:1.00, reduced from 2.75:1.00 prior to the First Amendment. The First Amendment also reduced the amount of Unrestricted Cash (as defined in the 2020 Credit Facility) used in calculating the Borrower's Consolidated Net Leverage Ratio from $25 million to $10 million.

On December 1, 2020, we entered into a Second Amendment to the 2020 Credit Facility to obtain consent for an equity exchange with AVCT as well as amend certain provisions of the 2020 Credit Facility.

We were in compliance with all covenants of the 2020 Credit Facility at December 31, 2020.

At December 31, 2020, we had an outstanding Term A Loan balance of $318.5 million at an average interest rate of 3.4%, and the Term B Loan had an outstanding balance of $74.6 million at average interest rate of 8.40%. The 2020 Revolving Credit Facility did not have an outstanding balance but had $5.6 million of letters of credit outstanding with an interest rate of 2.5%.

We are exposed to financial market risk related to foreign currency fluctuations and changes in interest rates. These exposures are actively monitored by management. To manage the volatility related to the exposure to changes in interest rates, we have entered into a derivative financial instrument. Management's objective is to reduce, where it is deemed appropriate to do so, fluctuations in earnings and cash flows associated with changes in interest rates. Our policies and practices are to use derivative financial instruments only to the extent necessary to manage exposures. We do not hold or issue derivative financial instruments for trading or speculative purposes.

As a result of exposure to interest rate movements, during March 2020, we entered into an interest rate swap arrangement, which effectively converted our $400 million term loan with its variable interest rate based upon one-month LIBOR to an aggregate fixed rate of 0.904%, plus a leverage-based margin as defined in the 2020 Credit Facility. The notional amount of this swap as of December 31, 2020 was $400 million, and the swap matures on March 3, 2025, the same date the Term A Loan and 2020 Revolving Credit Facility mature.

Our objectives in using interest rate derivatives are to add stability to interest expense and to manage our exposure to interest rate movements. To accomplish this objective, we are using an interest rate swap as part of our interest rate risk management strategy. Interest rate swaps designated as cash flow hedges involve the receipt of variable amounts from a counterparty in exchange for making fixed-rate payments over the life of the agreements without exchange of the underlying notional amount.

The effective portion of changes in the fair value of derivatives designated and that qualify as cash flow hedges is recorded in accumulated other comprehensive (loss) income in the consolidated balance sheet and is subsequently reclassified into earnings in the period that the hedged forecasted transactions affect earnings. During the year ended December 31, 2020, such

a derivative was used to hedge the variable cash flows associated with the 2020 Credit Agreement. Any ineffective portion of the change in fair value of the derivative would be recognized directly in earnings. However, during the year ended December 31, 2020, we recorded no hedge ineffectiveness.

Amounts reported in accumulated other comprehensive (loss) income related to our derivative will be reclassified to interest expense as interest is accrued on our variable-rate debt. Based upon projected forward rates, we estimate as of December 31, 2020 that $3.2 million may be reclassified as an increase to interest expense over the next 12 months.

From time to time, we may enter into uncommitted and unsecured short-term loans which we use for financing exports in China. Three of these loans, aggregating $3.5 million at a weighted average interest rate of 3.97%, were entered into in March 2020, two of which were with China Zheshang Bank and one of which was with Bank of Communications Hangzhou Branch. These loans expired and were paid in full at various dates in June and July 2020. In July 2020, we entered into an uncommitted and unsecured short-term loan in the amount of $0.7 million at an interest rate of 4.0% with Bank of Communications Hangzhou Branch that expired and was paid in full in November 2020.

We use letters of credit, performance and bid bonds in the course of our business. At December 31, 2020, we had $32.6 million of letters of credit, bank guarantees, performance and bid bonds outstanding (collectively, "Guarantees"), comprised of the $5.6 million of letters of credit under the 2020 Credit Facility described above, and $27.0 million of Guarantees under various uncommitted facilities. At December 31, 2020, we had cash collateral of $2.7 million supporting the Guarantees under our uncommitted facilities. This cash collateral is included in Restricted cash in our consolidated balance sheet at December 31, 2020.

In connection with the GENBAND Merger, on October 27, 2017, we issued a promissory note for approximately $23 million to certain of GENBAND's equity holders (the "Promissory Note"). On April 29, 2019, concurrently with the closing of the 2019 Credit Facility as discussed above, we repaid in full all outstanding amounts under the Promissory Note, totaling $24.7 million and comprised of $22.5 million of principal plus $2.2 million of interest converted to principal. We did not incur any early termination penalties in connection with this repayment.

Our IP Optical Networks segment maintains customer receivables factoring agreements with a number of financial institutions. Under the terms of these agreements, we may transfer receivables to the financial institutions, on a non-recourse basis, provided that the financial institutions approve the receivables in advance. During the year ended December 31, 2020, we received $119.8 million of cash from the sale of certain accounts receivable and recorded $0.9 million of interest expense in connection with these transactions.

In the second quarter of 2019, our Board approved a stock repurchase program pursuant to which we may repurchase up to $75 million of our common stock prior to April 18, 2021. Repurchases under the program may be made in the open market, in privately negotiated transactions or otherwise, with the amount and timing of repurchases depending on the market conditions and corporate discretion. This program does not obligate us to acquire any particular amount of common stock and the program may be extended, modified, suspended or discontinued at any time at the Board's discretion. During the year ended December 31, 2019, we repurchased and retired 1 million shares of our common stock for a total purchase price of $5 million, including transaction fees. We did not repurchase any shares during the year ended December 31, 2020. We had $70.5 million remaining under the program for future purchases at December 31, 2020.

Our operating activities provided $102 million and $56 million of cash in 2020 and 2019, respectively.

Cash provided by operating activities in 2020 was primarily the result of our net income, lower other operating assets, inventory and accounts receivable, higher accrued expenses and other long-term liabilities, and our non-cash operating income and expenses such as the gain on the Kandy Sale, amortization of intangible assets, stock-based compensation, depreciation, and amortization of debt issuance costs. These amounts were partially offset by lower accounts payable and deferred revenue. The decrease in other operating assets was primarily due to the payments received from Metaswitch aggregating $26 million in connection with the 2019 litigation settlement and subsequent supplemental agreement to accelerate the payment of amounts outstanding. The increase in accrued expenses and other long-term liabilities was primarily due to the derivative liability we recorded in connection with our interest rate swap, which we entered into in the first quarter of 2020.

Cash provided by operating activities in 2019 was generated from $106 million from our 2019 results, net of non-cash items comprising goodwill impairment, depreciation and amortization, stock-based compensation and other amounts, and $8 million received from increased efficiency of inventory, partially offset by cash used for higher other operating assets and accounts receivable aggregating $21 million, and lower liabilities of $37 million. The decrease in our liabilities was primarily related to lower accounts payable and accrued expenses and other long-term liabilities. The decrease in accounts payable

relates to the timing and amounts of purchases of both services and tangible goods and their related payment arrangements. The decrease in accrued expenses and other long-term liabilities primarily relates to lower accruals for employee-related expenses.

Our investing activities used $330 million and $4 million of cash in 2020 and 2019, respectively. Our 2020 investing activities were comprised of $347 million of cash paid as cash consideration for ECI and $26 million paid for property and equipment, partially offset by $43 million of cash proceeds from the sale of land in connection with the ECI Acquisition. Our 2019 activities were comprised of $11 million paid for property and equipment, partially offset by $7 million of maturities of marketable securities.

Our financing activities provided $319 million of cash in 2020 and used $51 million of cash in 2019.

Cash provided by financing activities in 2020 was primarily due to $479 million of proceeds from term debt, which was comprised of $400 million from the 2020 Credit Facility, $75 million from the Term B Loan under the Amended 2020 Credit Facility (concurrent with the repayment of the same amount of original debt under the 2020 Credit Facility as noted below) and $4 million of proceeds from short-term loans in China for the financing of certain export activities. These proceeds were partially offset by the repayment of the $75 million of debt that was extinguished in connection with the First Amendment, the repayment of $57 million outstanding under the 2019 Credit Facility (comprised of $8 million under the revolving credit facility and $49 million of long-term debt), the payment of $14 million of debt issuance costs in connection with the 2020 Credit Facility and the First Amendment and the repayment of principal aggregating $10 million related to the 2020 Credit Facility and short-term loans in China. We also paid $2 million for withholding obligations related to the net share settlement of restricted stock awards upon vesting and $1 million for principal payments on finance leases.

In 2019, we repaid outstanding borrowings of $165 million under our credit facilities, comprised of $164 million for borrowings under the revolving line of credit and $1 million for borrowings under the term loan. We also repaid $25 million on the note to certain of the former GENBAND equityholders and the deferred purchase consideration of $22 million to the selling Edgewater shareholders. We spent $5 million to repurchase and retire shares of our common stock on the open market and used $1 million to pay withholding obligations related to the net share settlement of restricted stock awards upon vesting. We also spent $1 million for principal payments on our finance lease obligations and $1 million for debt issuance costs. Our borrowings totaled $167 million, comprised of $117 million of borrowings under the revolving line of credit and $50 million of term loan debt under the 2019 Credit Facility. Cash proceeds from the sale of our common stock under our ESPP and from option exercises totaled approximately $1 million.

Contractual Obligations

Our contractual obligations at December 31, 2020 consisted of the following (in thousands):

	Payments due by period				
	Total	**Less than 1 year**	**1-3 years**	**3-5 years**	**More than 5 years**
Finance lease obligations	$ 1,469	$ 914	$ 555	$ —	$ —
Operating lease obligations	89,637	16,912	30,676	14,568	27,481
Purchase obligations	86,780	80,415	6,165	200	—
Restructuring severance obligations	5,410	5,410	—	—	—
Debt obligations - principal *	393,062	15,531	36,250	341,281	—
Debt obligations - interest	61,872	15,362	28,628	17,440	442
Employee postretirement defined benefit plans	10,717	1,508	3,230	2,287	3,692
Uncertain tax positions **	14,054	14,054	—	—	—
	$ 663,001	$ 150,106	$ 105,504	$ 375,776	$ 31,615

* Debt obligations - principal represents the outstanding balance on our 2020 Credit Facility of $393.1 million at December 31, 2020.

** This liability is not subject to fixed payment terms and the amount and timing of payments, if any, that we will make related to this liability are not known. See Note 2 and Note 25 to our consolidated financial statements appearing in this Annual Report on Form 10-K for additional information.

Based on our current expectations, we believe our current cash and available borrowings under the 2020 Credit Facility will be sufficient to meet our anticipated cash needs for working capital and capital expenditures for at least twelve months. The rate at which we consume cash is dependent on the cash needs of our future operations. We anticipate devoting substantial capital resources to continue our research and development efforts, to maintain our sales, support and marketing, to complete merger-related integration activities and for other general corporate activities. We further believe that our financial resources, along with managing discretionary expenses, will allow us to manage the anticipated impact of the COVID-19 pandemic on our business operations. Looking ahead, we have developed contingency plans to reduce costs further if the situation deteriorates further. The challenges posed by the COVID-19 pandemic on our business continue to evolve rapidly. Consequently, we continue to evaluate our financial position in light of future developments, particularly those relating to the COVID-19 pandemic. However, it is difficult to predict future liquidity requirements with certainty, and our cash and available borrowings under the 2020 Credit Facility may not be sufficient to meet our future needs, which would require us to refinance our debt and/or obtain additional financing. We may not be able to refinance our debt or obtain additional financing on favorable terms or at all.

Recent Accounting Pronouncements

The Financial Accounting Standards Board ("FASB") has issued the following accounting pronouncements, all of which became effective for us in 2020 and none of which had a material impact on our consolidated financial statements:

In March 2020, the FASB issued Accounting Standard Updates ("ASU") 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting* ("ASU 2020-04"), which provides optional expedients and exceptions for applying generally accepted accounting principles to contract modifications and hedging relationships, subject to meeting certain criteria that reference LIBOR or another reference rate expected to be discontinued.

In March 2020, the FASB issued ASU 2020-03, *Codification Improvements to Financial Instruments* ("ASU 2020-03"), which makes narrow-scope amendments related to topics regarding fair value option disclosures, applicability of the portfolio exception in Accounting Standards Codification ("ASC") 820 to nonfinancial items, disclosures for depository and lending institutions, cross reference to guidance in ASC 470-50 on line of credit or revolving debt arrangements, cross reference to net asset value practical expedient in ASC 820-10, interaction between ASC 842 and ASC 326 and between ASC 326 and ASC 860-20.

In August 2018, the FASB issued ASU 2018-15, *Intangibles - Goodwill and Other - Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract* ("ASU 2018-15"), which provides guidance on implementation costs incurred in a cloud computing arrangement ("CCA") that is a service contract. ASU 2018-15 amends ASC 350, *Intangibles - Goodwill and Other* ("ASC 350") to include in its scope implementation costs of a CCA that is a service contract and clarifies that a customer should apply the guidance in ASC 350-40 to determine which implementation costs should be capitalized in such a CCA.

In August 2018, the FASB issued ASU 2018-14, *Compensation - Retirement Benefits - Defined Benefit Plans - General (Subtopic 715-20): Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans* ("ASU 2018-14"), which amends ASC 715, *Compensation - Retirement Benefits*, to add, remove and clarify disclosure requirements related to defined benefit pension and other postretirement plans.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement* ("ASU 2018-13"), which changes the fair value measurement requirements of ASC 820, *Fair Value Measurement.*

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"), which adds an impairment model that is based on expected losses rather than incurred losses. Under ASU 2016-13, an entity recognizes as an allowance its estimate of expected credit losses, which the FASB believes will result in more timely recognition of such losses. In April and May 2019, the FASB issued ASU 2019-04, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments* ("ASU 2019-04") and ASU 2019-05 *Financial Instruments - Credit Losses (Topic 326): Targeted Transition Relief* ("ASU 2019-05"), respectively. ASU 2019-04 provides transition relief for entities adopting ASU 2016-13 and ASU 2019-05 clarifies certain aspects of the accounting for credit losses, hedging activities and financial instruments in connection with the adoption of ASU 2016-13.

The FASB has issued the following accounting pronouncement which became effective for us in 2021, which we do not believe will have a material impact on our consolidated financial statements upon adoption:

The FASB issued ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes* ("ASU 2019-12"), which modifies ASC 740 to simplify the accounting for income taxes. ASU 2019-12 addresses the accounting for hybrid tax regimes, tax basis step-up in goodwill obtained in a transaction that is not a business combination, separate financial statements of legal entities not subject to tax, intraperiod tax allocation exception to incremental approach, ownership changes in investments - changes from a subsidiary to an equity method investment, ownership changes in investments - changes from an equity method investment to a subsidiary, interim period accounting for enacted changes in tax law and year-to-date loss limitation in interim period tax accounting.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to a variety of market risks, changes in interest rates affecting the return on our investments and foreign currency fluctuations.

To manage the volatility related to the exposure to changes in interest rates, we have entered into a derivative financial instrument. Our objective is to reduce, where it is deemed appropriate to do so, fluctuations in earnings and cash flows associated with changes in interest rates. Our policies and practices are to use derivative financial instruments only to the extent necessary to manage exposures. We do not hold or issue derivative financial instruments for trading or speculative purposes.

Amounts reported in accumulated other comprehensive (loss) income related to our derivative will be reclassified to interest expense as interest is accrued on our variable-rate debt. Our derivative had a fair value of $10.9 million at December 31, 2020, consisting of $3.1 million included in Accrued expenses and other and $7.8 million included in Other long-term liabilities on our consolidated balance sheet. Based upon projected forward rates, we estimate as of December 31, 2020 that $3.2 million may be reclassified as an increase to interest expense over the next twelve months.

At December 31, 2020, we had outstanding debt totaling approximately $393.1 million. A hypothetical movement of plus or minus 50 basis points in the interest rate of our outstanding debt would have changed our interest expense by approximately $2 million for the year ended December 31, 2020.

Based on a hypothetical 10% adverse movement in all foreign currency exchange rates, our revenue for the year ended December 31, 2020 would have been adversely affected by approximately $22 million and our net income for the year ended December 31, 2020 would have been adversely affected by approximately $7 million, although the actual effects may differ materially from this hypothetical analysis.

Item 8. Financial Statements and Supplementary Data

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Ribbon Communications Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Ribbon Communications Inc. and subsidiaries (the "Company") as of December 31, 2020 and 2019, 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, 2020, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020, in conformity with accounting principles generally accepted in the United States of America.

We have also 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, 2020, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 26 2021, expressed an unqualified opinion on the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 2 to the financial statements, the Company adopted Accounting Standards Codification Topic 842, “Leases,” using the alternative transition approach on January 1, 2019.

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 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.

Revenue Recognition — Refer to Notes 2 and 17 to the financial statements

Critical Audit Matter Description

The Company recognizes revenue from two primary sources: products and services. Generally, contracts with customers contain multiple performance obligations, consisting of products and services. For these contracts, the Company accounts for individual performance obligations separately if they are considered distinct. When an arrangement contains more than one performance obligation, the Company will allocate the transaction price to each performance obligation on a relative standalone selling price basis. The Company utilizes the observable price of goods and services when they are sold separately to similar customers in order to estimate standalone selling price.

Management is required to use judgment to develop its estimates of standalone selling price. Auditing the Company's estimates of standalone selling price required a high degree of auditor judgment and an increased extent of effort, including the need to involve our data analytics specialists to assist in the testing of the standalone selling price analyses given the judgment required by management in this area.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the testing of management's estimation of standalone selling prices included the following, among others:

- We tested the effectiveness of controls over revenue, including those over the determination of estimated standalone selling price.
- We evaluated whether management's significant accounting policies related to the estimation of standalone selling price were appropriate.
- With the assistance of our data analytics specialists, we evaluated the estimated standalone selling price analyses prepared by the Company, including testing the underlying detail of standalone sales and the mathematical accuracy of the calculations.

Business Combinations – ECI Telecom Group Ltd. Acquisition – Refer to Notes 2 and 3 to the financial statements

Critical Audit Matter Description

The Company completed the acquisition of ECI Telecom Group Ltd. ("ECI") on March 3, 2020 by issuing to the ECI shareholders and certain others 32.5 million shares of the Company's common stock with a fair value of $108.6 million and paying $322.5 million of cash. The Company accounted for the acquisition under the acquisition method of accounting for business combinations. Accordingly, the purchase price was allocated to the assets acquired and liabilities assumed based on their respective fair values, including customer relationships, developed technology, and in-process research and development intangible assets with an aggregate fair value of approximately $116 million, $112 million, and $34 million, respectively. The Company used an income approach to value the acquired in-process research and development, developed technology, and customer relationships intangible assets. The fair value determination of these intangible assets required management to make significant estimates and assumptions related to forecasted future cash flows, including the selection of customer attrition rates, technology obsolescence, revenue growth rates, and discount rates.

We identified the intangible assets for ECI as a critical audit matter because of the significant estimates and assumptions management made to fair value these assets. This required a high degree of auditor judgment and an increased extent of effort, including the involvement of our fair value specialists, when performing audit procedures to evaluate the reasonableness of management's forecasts of future cash flows, including the selection of customer attrition rates, technology obsolescence, revenue growth rates, and discount rates.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the forecasts of future cash flows and the selection of the customer attrition rates, technology obsolescence, revenue growth rates, and discount rates for the intangible assets for ECI included the following, among others:

- We tested the effectiveness of controls over the valuation of the customer relationships, developed technology, and in-process research and development intangible assets, including management's controls over forecasts of future cash flows and the selection of the customer attrition rates, technology obsolescence, revenue growth rates, and discount rates.
- We assessed the reasonableness of fiscal year 2020 forecasted cash flows of revenues and operating margins by comparing them to ECI's actual 2020 cash flows.
- We assessed the reasonableness of the forecasted revenue growth rates over the cash flow forecast period by comparing them to ECI's actual revenue growth rates during the most recent historical periods as well as certain peer companies, third-party industry forecasts, and internal communications to management and the board of directors.

- We performed sensitivity analyses of the significant assumptions used in the valuation model to evaluate the change in fair value resulting from changes in the significant assumptions.

- With the assistance of our fair value specialists, we evaluated the reasonableness of the (1) valuation methodology; (2) customer attrition rates by testing the mathematical accuracy of the rates used and comparing them to historical customer data; (3) technology obsolescence by testing the source information; (4) revenue growth rates by comparing them to industry growth rates and the projected nominal gross domestic product (GDP) growth rate; and (5) discount rates, which included testing the source information underlying the determination of the discount rates, testing the mathematical accuracy of the calculations, and developing a range of independent estimates and comparing those to the discount rates selected by management.

/s/ Deloitte & Touche LLP

Dallas, Texas
February 26, 2021

We have served as the Company's auditor since 2005.

RIBBON COMMUNICATIONS INC.
Consolidated Balance Sheets
(in thousands, except share and per share data)

	December 31, 2020	December 31, 2019
Assets		
Current assets:		
Cash and cash equivalents	$ 128,428	$ 44,643
Restricted cash	7,269	—
Accounts receivable, net	237,738	192,706
Inventory	45,750	14,800
Other current assets	28,461	27,146
Total current assets	447,646	279,295
Property and equipment, net	48,888	28,976
Intangible assets, net	417,356	213,366
Goodwill	416,892	224,896
Investments	115,183	—
Deferred income taxes	10,651	4,959
Operating lease right-of-use assets	69,757	36,654
Other assets	20,892	26,762
	$ 1,547,265	$ 814,908
Liabilities and Stockholders' Equity		
Current liabilities:		
Current portion of term debt	$ 15,531	$ 2,500
Revolving credit facility	—	8,000
Accounts payable	63,387	31,412
Accrued expenses and other	134,865	56,700
Operating lease liabilities	17,023	7,719
Deferred revenue	96,824	100,406
Total current liabilities	327,630	206,737
Long-term debt, net of current	369,035	45,995
Operating lease liabilities, net of current	72,614	37,202
Deferred revenue, net of current	26,010	20,482
Deferred income taxes	16,842	4,648
Other long-term liabilities	48,281	16,589
Total liabilities	860,412	331,653
Commitments and contingencies (Note 27)		
Stockholders' equity:		
Preferred stock, $0.01 par value; 10,000,000 shares authorized; none issued and outstanding	—	—
Common stock, 240,000,000 shares authorized, $0.0001 par value, 145,425,248 shares issued and outstanding at December 31, 2020; 110,471,995 shares issued and outstanding at December 31, 2019	15	11
Additional paid-in capital	1,870,256	1,747,784
Accumulated deficit	(1,178,476)	(1,267,067)
Accumulated other comprehensive (loss) income	(4,942)	2,527
Total stockholders' equity	686,853	483,255
	$ 1,547,265	$ 814,908

See notes to the consolidated financial statements.

RIBBON COMMUNICATIONS INC.
Consolidated Statements of Operations
(in thousands, except per share data)

	Year ended December 31,		
	2020	2019	2018
Revenue:			
Product	$ 467,912	$ 262,030	$ 279,014
Service	375,883	301,081	298,891
Total revenue	843,795	563,111	577,905
Cost of revenue:			
Product	204,772	95,774	103,209
Service	145,916	112,680	127,388
Total cost of revenue	350,688	208,454	230,597
Gross profit	493,107	354,657	347,308
Operating expenses:			
Research and development	194,525	141,060	145,462
Sales and marketing	139,318	106,310	117,529
General and administrative	63,286	53,870	66,036
Amortization of acquired intangible assets	60,910	49,225	49,723
Impairment of goodwill	—	164,300	—
Acquisition-, disposal- and integration-related	17,164	12,953	16,951
Restructuring and related	16,235	16,399	17,015
Total operating expenses	491,438	544,117	412,716
Income (loss) from operations	1,669	(189,460)	(65,408)
Interest expense, net	(21,042)	(3,877)	(4,230)
Other income (expense), net	112,690	70,444	(3,772)
Income (loss) before income taxes	93,317	(122,893)	(73,410)
Income tax provision	(4,726)	(7,182)	(3,400)
Net income (loss)	$ 88,591	$ (130,075)	$ (76,810)
Earnings (loss) per share:			
Basic	$ 0.64	$ (1.19)	$ (0.74)
Diluted	$ 0.61	$ (1.19)	$ (0.74)
Shares used to compute earnings (loss) per share:			
Basic	138,967	109,734	103,916
Diluted	144,650	109,734	103,916

See notes to the consolidated financial statements.

RIBBON COMMUNICATIONS INC.
Consolidated Statements of Comprehensive Income (Loss)
(in thousands)

	Year ended December 31,		
	2020	2019	2018
Net income (loss)	$ 88,591	$ (130,075)	$ (76,810)
Other comprehensive income (loss), net of tax:			
Unrealized loss on interest rate swap, net of reclassifications	(10,948)	—	—
Foreign currency translation adjustments	894	194	220
Unrealized gain on available-for-sale marketable securities, net of reclassification adjustments for realized amounts	—	590	45
Employee retirement benefits	2,585	(1,960)	369
Other comprehensive (loss) income, net of tax	(7,469)	(1,176)	634
Comprehensive income (loss), net of tax	$ 81,122	$ (131,251)	$ (76,176)

See notes to the consolidated financial statements.

RIBBON COMMUNICATIONS INC.
Consolidated Statements of Stockholders' Equity
(in thousands, except share data)

	Common stock					
	Shares	Amount	Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive income (loss)	Total stockholders' equity
Balances, January 1, 2018	**101,752,856**	**$ 10**	**$ 1,684,768**	**$ (1,072,426)**	**$ 3,069**	**$ 615,421**
Adoption of Accounting Standards Codification 606, *Revenue from Contracts with Customers*				12,244		12,244
Exercise of stock options	15,935		73			73
Vesting of restricted stock units	1,278,062					—
Vesting of performance-based stock awards and units	57,768					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(524,516)		(2,024)			(2,024)
Shares issued as consideration in connection with the acquisition of Edgewater Networks, Inc.	4,235,531	1	29,999			30,000
Assumption of equity awards in connection with the acquisition of Edgewater Networks, Inc.			747			747
Stock-based compensation expense			10,013			10,013
Other comprehensive income					634	634
Net loss				(76,810)		(76,810)
Balances, December 31, 2018	**106,815,636**	**11**	**1,723,576**	**(1,136,992)**	**3,703**	**590,298**
Issuance of common stock in connection with employee stock purchase plan	282,646		863			863
Exercise of stock options	127,334		235			235
Vesting of restricted stock awards and units	1,504,707					—
Vesting of performance-based stock units	9,466					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(240,673)		(1,193)			(1,193)
Shares issued as consideration in connection with the acquisition of Anova Data, Inc.	2,948,793		15,186			15,186
Repurchase and retirement of common stock	(975,914)		(4,536)			(4,536)
Reclassification of liability to equity for bonuses converted to stock awards			1,052			1,052
Stock-based compensation expense			12,601			12,601
Other comprehensive loss					(1,176)	(1,176)
Net loss				(130,075)		(130,075)
Balances, December 31, 2019	**110,471,995**	**11**	**1,747,784**	**(1,267,067)**	**2,527**	**483,255**
Exercise of stock options	38,288		70			70
Vesting of restricted stock awards and units	2,246,690	1				1
Vesting of performance-based stock units	323,752					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(472,028)		(1,674)			(1,674)
Shares issued as consideration in connection with the acquisition of ECI Telecom Group Ltd.	32,500,000	3	108,547			108,550
Shares issued as consideration in connection with the acquisition of Anova Data, Inc.	316,551		1,630			1,630
Stock-based compensation expense			13,899			13,899
Other comprehensive loss					(7,469)	(7,469)
Net income				88,591		88,591
Balances, December 31, 2020	**145,425,248**	**$ 15**	**$ 1,870,256**	**$ (1,178,476)**	**$ (4,942)**	**$ 686,853**

See notes to the consolidated financial statements.

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RIBBON COMMUNICATIONS INC.
Consolidated Statements of Cash Flows
(in thousands)

	Year ended December 31,		
	2020	2019	2018
Cash flows from operating activities:			
Net income (loss)	$ 88,591	$ (130,075)	$ (76,810)
Adjustments to reconcile net income (loss) to cash flows provided by (used in) operating activities:			
Depreciation and amortization of property and equipment	17,188	11,949	11,200
Amortization of intangible assets	60,910	49,225	49,723
Amortization of debt issuance costs	5,673	360	204
Stock-based compensation	13,899	12,601	11,072
Impairment of goodwill	—	164,300	—
Deferred income taxes	(4,616)	5,299	513
Gain on sale of business	(83,552)	—	—
Increase in fair value of investments	(30,296)	—	—
Reduction to deferred purchase consideration	(70)	(8,124)	—
Foreign currency exchange losses	2,961	1,090	4,611
Changes in operating assets and liabilities:			
Accounts receivable	9,578	(3,936)	(13,017)
Inventory	11,842	7,776	993
Other operating assets	44,343	(17,849)	4,832
Accounts payable	(49,561)	(16,282)	(6,057)
Accrued expenses and other long-term liabilities	20,629	(18,538)	(13,422)
Deferred revenue	(5,955)	(2,111)	16,563
Net cash provided by (used in) operating activities	101,564	55,685	(9,595)
Cash flows from investing activities:			
Purchases of property and equipment	(26,721)	(10,824)	(7,907)
Business acquisitions, net of cash acquired	(346,852)	—	(46,389)
Sales/maturities of marketable securities	—	7,295	18,919
Proceeds from the sale of fixed assets	43,500	—	—
Net cash used in investing activities	(330,073)	(3,529)	(35,377)
Cash flows from financing activities:			
Borrowings under revolving line of credit	615	117,000	197,500
Principal payments on revolving line of credit	(8,615)	(164,000)	(162,500)
Proceeds from issuance of long-term debt	478,500	50,000	—
Principal payment of debt, related party	—	(24,716)	—
Principal payments of term debt	(134,188)	(1,250)	—
Payment of deferred purchase consideration	—	(21,876)	—
Principal payments of finance leases	(1,258)	(913)	(652)
Payment of debt issuance costs	(14,147)	(891)	(624)
Proceeds from the sale of common stock in connection with employee stock purchase plan	—	863	—
Proceeds from the exercise of stock options	70	235	73

RIBBON COMMUNICATIONS INC.
Consolidated Statements of Cash Flows (continued)
(in thousands)

	Year ended December 31,		
	2020	2019	2018
Payment of tax withholding obligations related to net share settlements of restricted stock awards	(1,674)	(1,193)	(2,024)
Repurchase of common stock	—	(4,536)	—
Net cash provided by (used in) financing activities	319,303	(51,277)	31,773
Effect of exchange rate changes on cash and cash equivalents	260	70	(180)
Net increase (decrease) in cash and cash equivalents	91,054	949	(13,379)
Cash and cash equivalents, beginning of year	44,643	43,694	57,073
Cash, cash equivalents and restricted cash, end of year	$ 135,697	$ 44,643	$ 43,694
Supplemental disclosure of cash flow information:			
Interest paid	$ 15,546	$ 4,072	$ 2,367
Income taxes paid	$ 9,293	$ 4,665	$ 5,505
Income tax refunds received	$ 1,163	$ 1,757	$ 537
Supplemental disclosure of non-cash investing activities:			
Capital expenditures incurred, but not yet paid	$ 3,749	$ 2,566	$ 1,127
Property and equipment acquired under finance leases	$ —	$ 1,442	$ 2,178
Business acquisition purchase consideration - common stock issued	$ 108,550	$ 15,186	$ 30,000
Business acquisition purchase consideration - deferred payments	$ 1,630	$ 1,700	$ 30,000
Business acquisition purchase consideration - assumed equity awards	$ —	$ —	$ 747
Supplemental disclosure of non-cash financing activities:			
Total fair value of restricted stock awards, restricted stock units, performance-based stock awards and performance-based stock units on date vested	$ 7,927	$ 7,422	$ 8,312

See notes to the consolidated financial statements.

(1) NATURE OF THE BUSINESS

Ribbon Communications Inc. ("Ribbon" or the "Company") is a leading global provider of communications technology to service providers and enterprises. The Company provides a broad range of software and high-performance hardware products, solutions and services that enable the secure delivery of data and voice communications for residential consumers and for small, medium, and large enterprises and industry verticals such as finance, education, government, utilities, and transportation. Ribbon's mission is to create a recognized global technology leader providing cloud-centric solutions that enable the secure exchange of information, with unparalleled scale, performance, and elasticity. The Company is headquartered in Plano, Texas, and has a global presence with research and development, or sales and support locations in over thirty-five countries around the world.

(2) BASIS OF PRESENTATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation

The consolidated financial statements have been prepared in United States dollars, in accordance with accounting principles generally accepted in the United States ("GAAP").

On December 1, 2020 (the "Kandy Sale Date"), American Virtual Cloud Technologies, Inc. ("AVCT") completed the purchase of the Company's cloud-based enterprise service business (the "Kandy Communications Business"). The revenue and expenses of the Kandy Communications Business are not included in the Company's consolidated financial statements for the period subsequent to the Kandy Sale Date.

On March 3, 2020 (the "ECI Acquisition Date"), the Company merged with ECI Telecom Group Ltd ("ECI") (the "ECI Acquisition"). The financial results of ECI are included in the Company's consolidated financial statements for the period subsequent to the ECI Acquisition Date.

On February 28, 2019 (the "Anova Acquisition Date"), the Company acquired the business and technology assets of Anova Data, Inc. ("Anova"). The financial results of Anova are included in the Company's consolidated financial statements for the period subsequent to the Anova Acquisition Date.

On August 3, 2018 (the "Edgewater Acquisition Date"), the Company completed the acquisition of Edgewater Networks, Inc. ("Edgewater" and such acquisition, the "Edgewater Acquisition"). The financial results of Edgewater are included in the Company's consolidated financial statements for the period subsequent to the Edgewater Acquisition Date.

Significant Accounting Policies

Principles of Consolidation

The accompanying consolidated financial statements include the accounts of Ribbon and its wholly-owned subsidiaries. All intercompany transactions and balances have been eliminated in consolidation.

Use of Estimates and Judgments

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting periods. Significant estimates and judgments relied upon in preparing these consolidated financial statements include accounting for business combinations, revenue recognition for multiple element arrangements, inventory valuations, assumptions used to determine the fair value of stock-based compensation, intangible assets, goodwill, debentures and warrants, legal contingencies and recoverability of Ribbon's net deferred tax assets and the related valuation allowances. Ribbon regularly assesses these estimates and records changes in estimates in the period in which they become known. Ribbon bases its estimates on historical experience and various other assumptions that it believes to be reasonable under the circumstances. Actual results could differ from those

estimates.

Reclassifications

In the fourth quarter of 2020, the Company reclassified amounts recorded for amortization of acquired intangible assets in prior presentations from Cost of revenue - product and Sales and marketing to a separate line included in operating expenses in the consolidated statements of operations, as management believes this presentation enhances the comparability of the Company's financial statements with industry peers. These reclassifications did not impact operating loss, net loss or loss per share for any historical periods. These reclassifications also did not impact the consolidated balance sheets or statements of cash flows for any historical periods. The Company did not reclassify depreciation of property and equipment related to production activities from cost of revenue to other accounts.

These reclassifications for the years ended December 31, 2019 and 2018 were as follows (in thousands):

	Year ended December 31, 2019			Year ended December 31, 2018		
	Prior presentation	Amounts reclassified	Revised presentation	Prior presentation	Amounts reclassified	Revised presentation
Product revenue	$ 262,030	$ —	$ 262,030	$ 279,014	$ —	$ 279,014
Service revenue	301,081	—	301,081	298,891	—	298,891
Total revenue	563,111	—	563,111	577,905	—	577,905
Cost of revenue - product	133,347	(37,573)	95,774	142,185	(38,976)	103,209
Cost of revenue - service	112,680	—	112,680	127,388	—	127,388
Total cost of revenue	246,027	(37,573)	208,454	269,573	(38,976)	230,597
Total gross profit	317,084	37,573	354,657	308,332	38,976	347,308
Research and development	141,060	—	141,060	145,462	—	145,462
Sales and marketing	117,962	(11,652)	106,310	128,276	(10,747)	117,529
General and administrative	53,870	—	53,870	66,036	—	66,036
Amortization of acquired intangible assets	—	49,225	49,225	—	49,723	49,723
Impairment of goodwill	164,300	—	164,300	—	—	—
Acquisition-, disposal- and integration-related	12,953	—	12,953	16,951	—	16,951
Restructuring and related	16,399	—	16,399	17,015	—	17,015
Total operating expenses	506,544	37,573	544,117	373,740	38,976	412,716
Operating loss	$ (189,460)	$ —	$ (189,460)	$ (65,408)	$ —	$ (65,408)

In addition, certain other reclassifications, not affecting previously reported net loss, have been made to the previously issued financial statements to conform to the current year presentation.

Business Combinations

The Company recognizes identifiable assets acquired and liabilities assumed at their acquisition date fair values. Goodwill as of the acquisition date is measured as the excess of consideration transferred over the net of the acquisition date fair values of the assets acquired and the liabilities assumed and represents the expected future economic benefits arising from other assets acquired in the business combination that are not individually identified and separately recognized. While the Company uses its best estimates and assumptions as part of the purchase price allocation process to accurately value assets acquired and liabilities assumed at the acquisition date, its estimates are inherently uncertain and subject to refinement. As a result, during the measurement period, which may be up to one year from the acquisition date, the Company records adjustments to the assets acquired and liabilities assumed with the corresponding offset to goodwill to the extent that it identifies adjustments to the preliminary purchase price allocation. Upon the conclusion of the measurement period or final determination of the values of assets acquired and liabilities assumed, whichever comes first, any subsequent adjustments are recorded to the consolidated statements of operations.

Revenue Recognition

The Company derives revenue from two primary sources: products and services. Product revenue includes the Company's hardware and software that function together to deliver the products' essential functionality. Software and hardware are also sold on a standalone basis. Services include customer support (software updates, upgrades and technical support), consulting, design services, installation services and training. Generally, contracts with customers contain multiple performance obligations, consisting of products and services. For these contracts, the Company accounts for individual performance obligations separately if they are considered distinct.

When an arrangement contains more than one performance obligation, the Company will allocate the transaction price to each performance obligation on a relative standalone selling price basis. The Company utilizes the observable price of goods and services when they are sold separately to similar customers in order to estimate standalone selling price.

The Company's software licenses typically provide a perpetual right to use the Company's software. The Company also sells term-based software licenses that expire and Software-as-a-Service ("SaaS")-based software which are referred to as subscription arrangements. The Company does not customize its software nor are installation services required, as the customer has a right to utilize internal resources or a third-party service company. The software and hardware are delivered before related services are provided and are functional without professional services or customer support. The Company has concluded that its software licenses are functional intellectual property that are distinct, as the user can benefit from the software on its own. Product revenue is typically recognized upon transfer of control or when the software is made available for download, as this is the point the user of the software can direct the use of, and obtain substantially all of the remaining benefits from, the functional intellectual property. The Company begins to recognize software revenue related to the renewal of subscription software licenses at the start of the subscription period.

The Company offers warranties on its products. Certain of the Company's warranties are considered to be assurance-type in nature, ensuring the product is functioning as intended. Assurance-type warranties do not represent separate performance obligations. The Company also sells separately-priced maintenance service contracts which qualify as service-type warranties and represent separate performance obligations. The Company does not allow and has no history of accepting product returns.

Services revenue includes revenue from customer support and other professional services. Customer support includes software updates on a when-and-if-available basis, telephone support, integrated web-based support and bug fixes or patches. The Company sells its customer support contracts at a percentage of list or net product price. Customer support revenue is recognized ratably over the term of the customer support agreement, which is typically one year.

The Company's professional services include consulting, technical support, resident engineer services, design services and installation services. Because control transfers over time, revenue is recognized based on progress toward completion of the performance obligation. The method to measure progress toward completion requires judgment and is based on the nature of the products or services to be provided. The Company generally uses the input method to measure progress for its contracts because it believes such method best depicts the transfer of assets to the customer, which occurs as the Company incurs costs for the contracts. However, in some instances, the Company uses the output method because it best depicts the transfer of asset to the customer. Under the cost-to-cost measure of progress, the progress toward completion is measured based on the ratio of costs incurred to date to the total estimated costs at completion of the performance obligation. When the measure of progress is based upon expended labor, progress toward completion is measured as the ratio of labor time expended to date versus the total estimated labor time required to complete the performance obligation. Revenue is recorded proportionally as costs are incurred or as labor is expended. Costs to fulfill these obligations include internal labor as well as subcontractor costs.

Customer training includes courses offered by the Company. The related revenue is typically recognized as the training services are performed.

Operating Segments

The Company's chief operating decision maker (the "CODM") is its president and chief executive officer. Effective in the fourth quarter of 2020 and in connection with the ECI Acquisition, the CODM began to assess the Company's performance based on the performance of two separate organizations within Ribbon: the Cloud and Edge segment ("Cloud and Edge") and the IP Optical Networks segment ("IP Optical Networks"). Financial information for the IP Optical Networks segment is not

presented for any years prior to 2020, as this segment arose from the ECI Acquisition, and accordingly is not included in the Company's consolidated financial statements for the years ended December 31, 2019 and 2018.

Financial Instruments

The carrying amounts of Ribbon's financial instruments approximate their fair values and include accounts receivable, convertible debentures and warrants received as sale consideration, borrowings under a revolving credit facility, accounts payable and term debt.

Investments in marketable securities are reported at fair value, with unrealized gains and losses excluded from earnings and reported, net of tax, in Accumulated other comprehensive income (loss), which is a component of stockholders' equity. Unrealized losses that are determined to be other-than-temporary, based on current and expected market conditions, are recognized in earnings. Declines in fair value determined to be credit-related are charged to earnings. The cost of marketable securities sold is determined by the specific identification method.

Changes in fair value of investments classified as trading securities, such as the convertible debentures and warrants received as sale consideration, are recognized in earnings as components of Other income (expense), net.

Financial instruments with remaining maturities or that are due within one year from the balance sheet date are classified as current. Financial instruments with maturities or that are payable more than one year from the balance sheet date are classified as noncurrent.

Restricted Cash

The Company classifies as restricted cash all cash pledged as collateral to secure long-term obligations and all cash whose use is otherwise limited by contractual provisions. At December 31, 2020, the Company had $7.3 million of restricted cash, comprised of $4.6 million restricted in connection with a tax payment on certain fixed assets formerly held by ECI that were sold in connection with the ECI Acquisition, and $2.7 million of restricted short-term bank deposits pledged to secure certain performance and financial bonds as security for the Company's obligations under tenders, contracts and to one of its main subcontractors.

Transfers of Financial Assets

The Company's IP Optical Networks segment maintains customer receivables factoring agreements with a number of financial institutions. Under the terms of these agreements, the Company may transfer receivables to the financial institutions, on a non-recourse basis, provided that the financial institutions approve the receivables in advance. The Company maintains credit insurance policies from major insurance providers or obtains letters of credit from the customers for a majority of its factored trade receivables. The Company accounts for the factoring of its financial assets as a sale of the assets and records the factoring fees, when incurred, as a component of interest expense in the consolidated statements of operations, and the proceeds from the sales of receivables are included in cash from operating activities in the consolidated statements of cash flows. During the year ended December 31, 2020, the Company received $119.8 million of cash from the sale of certain accounts receivable and recorded $0.9 million of interest expense in connection with these transactions.

Foreign Currency Translation

For foreign subsidiaries where the functional currency is the local currency, assets and liabilities are translated into U.S. dollars at the current exchange rate on the balance sheet date. Revenue and expenses are translated at average rates of exchange prevailing during each period. Translation adjustments for these subsidiaries are included in Accumulated other comprehensive income.

For foreign subsidiaries where the functional currency is the U.S. dollar, monetary assets and liabilities are translated into U.S. dollars at the current exchange rate on the balance sheet date. Nonmonetary assets and liabilities are remeasured into U.S. dollars at historical exchange rates. Revenue and expense items are translated at average rates of exchange prevailing during each period. Translation adjustments for these subsidiaries are included in Other income (expense), net.

Realized and unrealized foreign currency exchange gains and losses arising from transactions denominated in currencies other than the subsidiary's functional currency are reflected in earnings.

The Company records its foreign currency gains (losses) as a component of Other income (expense), net. The Company recognized net foreign currency losses of $3.0 million for the year ended December 31, 2020, $1.1 million for the year ended December 31, 2019 and $4.6 million for the year ended December 31, 2018.

Inventory

Inventory is recorded at the lower of cost or market value using the first-in, first-out convention. The Company reduces the carrying value of inventory for those items that are potentially excess, obsolete or slow-moving based on changes in customer demand, technology developments or other economic factors.

Ribbon writes down evaluation equipment (equipment at customer sites for testing and evaluation) at the time of shipment to its customers, as it is probable that the inventory value will not be realized.

Deferred product costs represent deferred cost of revenue for product shipments to customers prior to satisfaction of Ribbon's revenue recognition criteria. The Company classifies inventory that is not expected to be consumed within one year from the balance sheet date as noncurrent and includes such inventory as a component of Other assets.

Debentures and Warrants.

The Company has Debentures and Warrants that it received as sale consideration in connection with the sale of the Kandy Communications Business (see Note 4), which Ribbon accounts for in accordance with Accounting Standards Codification ("ASC") 820, *Fair Value Measurement* ("ASC 820)".

The Company calculates the fair value of the Debentures using a Lattice-based valuation approach, which utilizes a binomial tree to model the different paths the price of AVCT's common stock might take over the Debentures' life by using assumptions regarding the stock price volatility and risk-free interest rate. These results are then used to calculate the fair value of the Debentures at each measurement date. The Company uses the Black-Scholes valuation model for estimating the fair value of the Warrants at each measurement date. The fair value of the Warrants is affected by AVCT's stock price as well as valuation assumptions, including the volatility of AVCT's stock price, expected term of the option, risk-free interest rate and expected dividends. Both the Lattice and Black-Scholes valuation models are based on available market data, giving consideration to all of the rights and obligations of each instrument and precluding the use of "blockage" discounts or premiums in determining the fair value of a large lock of financial instruments.

The Company is calculating the fair value of the Debentures and Warrants at each quarter-end and recording any adjustments to the fair values in Other income (expense), net. The fair values of the Debentures and Warrants are reported as Investments in the Company's consolidated balance sheet at December 31, 2020.

Property and Equipment

Property and equipment are stated at cost, net of accumulated depreciation. Expenditures for maintenance and repairs are charged to expense as incurred. Depreciation is computed using the straight-line method over the estimated useful lives of the related assets, which range from two to five years. Leasehold improvements are amortized over the lesser of the lease term or five years. When an asset is sold or retired, the cost and related accumulated depreciation or amortization are eliminated, and the resulting gain or loss, if any, is recognized in income (loss) from operations in the consolidated statement of operations. The Company reviews property and equipment for impairment in the same manner as intangible assets discussed below.

Software development costs associated with internal use software are incurred in three stages of development: the preliminary project stage, the application development stage and the post-implementation stage. Costs incurred during the preliminary project and post-implementation stages are expensed as incurred. Certain qualifying costs incurred during the application development stage are capitalized as property and equipment. Internal use software is amortized on a straight-line basis over its estimated useful life of three years, beginning when the software is ready for its intended use.

Intangible Assets and Goodwill

The Company's intangible assets are comprised of in-process research and development, developed technology, customer relationships, trade names, and internal use software. Intangible assets are reviewed for impairment when events or changes in circumstances indicate that their carrying amounts may not be recoverable based upon the estimated undiscounted cash flows. Recoverability of intangible assets with estimated lives and other long-lived assets is measured by a comparison of the carrying amount of an asset or asset group to future net undiscounted cash flows expected to be generated by the asset or asset group. If these comparisons indicate that an asset is not recoverable, the Company will recognize an impairment loss for the amount by which the carrying value of the asset or asset group exceeds the related estimated fair value. Estimated fair value is based on either discounted future operating cash flows or appraised values, depending on the nature of the asset. The Company amortizes its intangible assets over their respective useful lives, with the exception of in-process research and development, which has an indefinite life until the product is generally available, at which time such asset is typically reclassified to developed technology, and the Company begins to amortize this asset. See Note 10 for additional information regarding the Company's intangible assets.

Goodwill is recorded when the consideration for an acquisition exceeds the fair value of net tangible and identifiable intangible assets acquired. Goodwill is not amortized, but instead is tested for impairment at least annually, or more frequently if indicators of potential impairment exist, by comparing the fair value of the Company's reporting unit to its carrying value.

Prior to 2020, the Company's annual test for impairment of goodwill was completed as of November 30. Effective in 2020, the Company changed its annual goodwill impairment test date from November 30 to October 1. This change did not have a material impact on the Company's consolidated financial statements.

As described above, effective in the fourth quarter of 2020, the Company determined that it has two operating segments: Cloud and Edge, and IP Optical Networks. For the purpose of testing goodwill for impairment, all goodwill is assigned to a reporting unit, which may be either an operating segment or a portion of an operating segment. The Company's reporting units are its operating segments. The Company performs a fair value analysis using both an income and market approach, which encompasses a discounted cash flow analysis and a guideline public company analysis using selected multiples. The Company assesses each valuation methodology based upon the relevance and availability of the data at the time the valuation is performed and the methodologies are weighted appropriately. Any impairment charges are reported separately in the Company's consolidated statements of operations.

Stock-Based Compensation

The Company's stock-based compensation cost is measured at the grant date based on the fair value of the award and is recognized as expense over the requisite service period, which generally represents the vesting period, and includes an estimate of the awards that will be forfeited.

The Company uses the Black-Scholes valuation model for estimating the fair value on the date of grant of stock options. The fair value of stock option awards is affected by the Company's stock price as well as valuation assumptions, including the volatility of Ribbon's stock price, expected term of the option, risk-free interest rate and expected dividends.

The Company may grant performance-based stock units ("PSUs") that include a market condition to certain of its executives. The Company uses a Monte Carlo simulation approach to model future stock price movements based upon the risk-free rate of return, the volatility of each entity and the pair-wise covariance between each entity. These results are then used to calculate the grant date fair values of the PSUs.

Concentration of Risk

The financial instruments that potentially subject Ribbon to concentrations of credit risk are cash, restricted cash and accounts receivable. The Company's cash equivalents and investments were managed by one financial institution at December 31, 2020. Historically, the Company has not experienced significant losses due to such bank depository concentration. The Company's investments at December 31, 2020 consisted of securities of AVCT (see Note 4). The Company did not hold any investments at December 31, 2019.

Certain components and software licenses from third parties used in Ribbon's products are procured from single sources of supply. The failure of a supplier, including a subcontractor, to deliver on schedule could delay or interrupt Ribbon's delivery of products and thereby materially adversely affect Ribbon's revenue and operating results.

Advertising Costs

Advertising costs are expensed as incurred and included as a component of Sales and marketing expense in the Company's consolidated statements of operations. Advertising expenses were $0.8 million for the year ended December 31, 2020, $0.5 million for the year ended December 31, 2019 and $0.5 million for the year ended December 31, 2018.

Loss Contingencies and Reserves

Ribbon is subject to ongoing business risks arising in the ordinary course of business, including legal claims, that affect the estimation process of the carrying value of assets, the recording of liabilities and the possibility of various loss contingencies. An estimated loss contingency is accrued when it is probable that a liability has been incurred or an asset has been impaired and the amount of loss can be reasonably estimated. Ribbon regularly evaluates current information available to determine whether such amounts should be adjusted and records changes in estimates in the period they become known.

An allowance for doubtful accounts is estimated based on the Company's assessment of the collectability of specific customer accounts.

Ribbon accrues for royalties for technology that it licenses from vendors based on established royalty rates and usage. Ribbon is periodically contacted by third parties who claim that Ribbon's products infringe on certain intellectual property of a third party. Ribbon evaluates these claims and accrues amounts when it is probable that the obligation has been incurred and the amounts are reasonably estimable.

Warranty

The Company records warranty liabilities for estimated costs of fulfilling its obligations under standard limited hardware and software warranties at the time of sale. The specific warranty terms and conditions vary depending upon the country in which the Company does business, but generally includes material costs, technical support, labor and associated overhead over a period ranging from one to three years. The Company assumed ECI's warranty liability in connection with the ECI Acquisition. At December 31, 2020, the Company's liability for product warranties was $14.9 million, of which $6.5 million was current and included in Accrued expenses and other and $8.4 million was long-term and included in Other long-term liabilities in the Company's consolidated balance sheet. The Company did not have a warranty accrual at December 31, 2019.

Research and Development Grants

The Company records grants received from the Office of the Innovation Authority of the Israeli Ministry of Economics (the "IIA") as a reduction to Research and development expense. Royalties payable to the IIA are recognized pursuant to sales of related products and are included in Cost of revenue - product.

Accounting for Leases

The Company accounts for its leases in accordance with Accounting Standards Codification ("ASC") 842, *Leases* ("ASC 842"), which was adopted effective January 1, 2019 using the alternative transition method, which allowed entities to initially apply ASC 842 at the adoption date with no adjustments to prior period lease costs for comparability (see Note 22). The Company has operating and finance leases for corporate offices, research and development facilities, and certain equipment. Operating leases are reported separately in the Company's consolidated balance sheets at December 31, 2020 and 2019. Assets acquired under finance leases are included in Property and equipment, net, in the consolidated balance sheets at December 31, 2020 and 2019.

The Company determines if an arrangement is a lease at inception. A contract is determined to contain a lease component if the arrangement provides the Company with a right to control the use of an identified asset. Lease agreements may include lease and non-lease components. In such instances for all classes of underlying assets, the Company does not separate lease and

non-lease components but rather, accounts for the entire arrangement under leasing guidance. Leases with an initial term of 12 months or less are not recorded on the balance sheet and lease expense for these leases is recognized on a straight-line basis over the lease term.

For operating leases, lease expense for minimum fixed lease payments is recognized on a straight-line basis over the lease term. The expense for finance leases includes both interest and amortization expense components, with the interest component calculated based on the effective interest method and the amortization component calculated based on straight-line amortization of the right-of-use asset over the lease term. Lease contracts may contain variable lease costs, such as common area maintenance, utilities and tax reimbursements that vary over the term of the contract. Variable lease costs are not included in minimum fixed lease payments and as a result, are excluded from the measurement of the right-of-use assets and lease liabilities. The Company expenses all variable lease costs as incurred.

Accounting for Income Taxes

Deferred tax assets and liabilities are recognized for the expected future consequences of events that have been reflected in the consolidated financial statements. Deferred tax assets and liabilities are determined based on the differences between the financial reporting and tax basis of assets and liabilities and operating loss carryforwards, using tax rates expected to be in effect for the years in which the differences are expected to reverse. The Company records valuation allowances to reduce deferred income tax assets to the amount that is more likely than not to be realized.

The Company has provided for income taxes on the undistributed earnings of its non-U.S. subsidiaries as of December 31, 2020, excluding Ireland and Israel. These subsidiaries, excluding Ireland and Israel, are cost-plus or limited risk distributors that are not anticipated to need to use excess funds locally. Accordingly, the Company is required to recognize and record deferred taxes in 2020. The deferred taxes are recorded on the entire outside basis differences related to the foreign subsidiaries, the largest of these differences being undistributed earnings. At December 31, 2020, the Company had a deferred tax liability of $15.7 million related to withholding taxes in various countries.

The Company determines whether it is more likely than not that a tax position will be sustained upon examination. If it is not more likely than not that a position will be sustained, no amount of the benefit attributable to the position is recognized. The tax benefit to be recognized of any tax position that meets the more likely than not recognition threshold is calculated as the largest amount that is more than 50% likely of being realized upon resolution of the contingency. The Company accounts for interest and penalties related to uncertain tax positions as part of its provision for income taxes.

Defined Benefit Plans

The Company has defined benefit plans for some of its employees at various international locations. The Company recognizes retirement benefit assets or liabilities in the consolidated balance sheets reflecting the funded status of pension and other retirement benefit plans. Retirement benefit assets and liabilities are adjusted for the difference between the benefit obligations and the plan assets at fair value (measured at year-end), with the offset recorded directly to stockholders' equity through accumulated other comprehensive income (loss), net of tax. The amount recorded in stockholders' equity represents the after-tax unamortized actuarial gains or losses, unamortized transition obligations and unamortized prior service costs.

Recent Accounting Pronouncements

The Financial Accounting Standards Board ("FASB") has issued the following accounting pronouncements, all of which became effective for the Company in 2020 and none of which had a material impact on the Company's consolidated financial statements:

In March 2020, the FASB issued Accounting Standards Update ("ASU") 2020-04, *Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting* ("ASU 2020-04"), which provides optional expedients and exceptions for applying generally accepted accounting principles to contract modifications and hedging relationships, subject to meeting certain criteria that reference LIBOR or another reference rate expected to be discontinued.

In March 2020, the FASB issued ASU 2020-03, *Codification Improvements to Financial Instruments* ("ASU 2020-03"), which makes narrow-scope amendments related to topics regarding fair value option disclosures, applicability of the portfolio

exception in Accounting Standards Codification ("ASC") 820 to nonfinancial items, disclosures for depository and lending institutions, cross reference to guidance in ASC 470-50 on line of credit or revolving debt arrangements, cross reference to net asset value practical expedient in ASC 820-10, interaction between ASC 842 and ASC 326 and between ASC 326 and ASC 860-20.

In August 2018, the FASB issued ASU 2018-15, *Intangibles - Goodwill and Other - Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract* ("ASU 2018-15"), which provides guidance on implementation costs incurred in a cloud computing arrangement ("CCA") that is a service contract. ASU 2018-15 amends ASC 350, *Intangibles - Goodwill and Other* ("ASC 350") to include in its scope implementation costs of a CCA that is a service contract and clarifies that a customer should apply the guidance in ASC 350-40 to determine which implementation costs should be capitalized in such a CCA.

In August 2018, the FASB issued ASU 2018-14, *Compensation - Retirement Benefits - Defined Benefit Plans - General (Subtopic 715-20): Disclosure Framework - Changes to the Disclosure Requirements for Defined Benefit Plans* ("ASU 2018-14"), which amends ASC 715, *Compensation - Retirement Benefits*, to add, remove and clarify disclosure requirements related to defined benefit pension and other postretirement plans.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement* ("ASU 2018-13"), which changes the fair value measurement requirements of ASC 820, *Fair Value Measurement.*

In June 2016, the FASB issued ASU 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"), which adds an impairment model that is based on expected losses rather than incurred losses. Under ASU 2016-13, an entity recognizes as an allowance its estimate of expected credit losses, which the FASB believes will result in more timely recognition of such losses. In April and May 2019, the FASB issued ASU 2019-04, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments* ("ASU 2019-04") and ASU 2019-05 *Financial Instruments - Credit Losses (Topic 326): Targeted Transition Relief* ("ASU 2019-05"), respectively. ASU 2019-04 provides transition relief for entities adopting ASU 2016-13 and ASU 2019-05 clarifies certain aspects of the accounting for credit losses, hedging activities and financial instruments in connection with the adoption of ASU 2016-13.

The FASB has issued the following accounting pronouncement which became effective for the Company in 2021, which the Company does not believe will have a material impact on its consolidated financial statements upon adoption:

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes* ("ASU 2019-12"), which modifies ASC 740 to simplify the accounting for income taxes. ASU 2019-12 addresses the accounting for hybrid tax regimes, tax basis step-up in goodwill obtained in a transaction that is not a business combination, separate financial statements of legal entities not subject to tax, intraperiod tax allocation exception to incremental approach, ownership changes in investments - changes from a subsidiary to an equity method investment, ownership changes in investments - changes from an equity method investment to a subsidiary, interim period accounting for enacted changes in tax law and year-to-date loss limitation in interim period tax accounting.

(3) BUSINESS ACQUISITIONS

ECI

On the ECI Acquisition Date, Ribbon completed its merger transaction with ECI in accordance with the terms of the Agreement and Plan of Merger, dated as of November 14, 2019, by and among Ribbon, ECI, an indirect wholly-owned subsidiary of Ribbon ("Merger Sub"), Ribbon Communications Israel Ltd. and ECI Holding (Hungary) kft pursuant to which Merger Sub merged with and into ECI, with ECI surviving such merger as a wholly-owned subsidiary of Ribbon. Prior to the ECI Acquisition Date, ECI was a privately-held global provider of end-to-end packet optical transport and software-defined networking ("SDN") and network function virtualization ("NFV") solutions for service providers, enterprises and data center operators. Ribbon acquired ECI because it believed the ECI Acquisition would position the Company for growth and enhance

its competitive strengths by expanding its product portfolio beyond solutions primarily supporting voice applications to include data applications and optical networking.

As consideration for the ECI Acquisition, Ribbon issued the ECI shareholders and certain others 32.5 million shares of Ribbon common stock with a fair value of $108.6 million (the "Stock Consideration") and paid $322.5 million of cash (the "Cash Consideration"), comprised of $183.3 million to repay ECI's outstanding debt, including both principal and interest, and $139.2 million paid to ECI's selling shareholders. In addition, ECI shareholders received $33.4 million from the sale of certain of ECI's real estate assets. Cash Consideration was financed through cash on hand and committed debt financing consisting of a new $400 million term loan facility and $100 million revolving credit facility, which was undrawn at the ECI Acquisition Date.

The ECI Acquisition has been accounted for as a business combination and the financial results of ECI have been included in the Company's consolidated financial statements for the period subsequent to the ECI Acquisition. The Company's financial results for the year ended December 31, 2020 include $260.5 million of revenue and $52.9 million of net loss attributable to ECI.

As of December 31, 2020, the valuation of acquired assets, identifiable intangible assets and certain assumed liabilities had been finalized. During the fourth quarter of 2020, the Company reclassified the acquired assets held for employee' severance benefits of $13.2 million from other assets to other long-term liabilities. This reclassification was recorded to conform to the Company's presentation and resulted in a net long-term liability for severance benefits of $4.7 million in the Company's consolidated balance sheet at December 31, 2020. This amount reflects the net unfunded liability for the defined benefit plans assumed. This reclassification did not impact purchase consideration or goodwill. During the second quarter of 2020, the Company recorded changes to the initial preliminary purchase price allocation, including reductions of $10.4 million and $7.0 million to current and noncurrent inventory respectively, and increases to identifiable intangible assets aggregating $11.0 million, comprised of $3.0 million to in-process research and development, $5.0 million to developed technology, $2.0 million to customer relationships and $1.0 million to trade names. These adjustments, as well as other immaterial adjustments to other balance sheet accounts, resulted in a net increase to goodwill of $2.5 million. The allocation of purchase consideration to the fair value of assets acquired and liabilities assumed includes a noncurrent asset of $5.7 million that represents an indemnification receivable from ECI's selling shareholders for certain liabilities for uncertain tax positions in accordance with the Agreement and Plan of Merger.

A summary of the allocation of the purchase consideration for ECI is as follows (in thousands):

Fair value of consideration transferred:		
Cash consideration:		
Repayment of ECI outstanding debt obligations	$	183,266
Cash paid to selling shareholders		139,244
Payment to selling shareholders from sale of ECI real estate assets		33,400
Less cash and restricted cash acquired		(9,058)
Net cash consideration		346,852
Fair value of Ribbon stock issued		108,550
Fair value of total consideration	$	455,402

Fair value of assets acquired and liabilities assumed:		
Current assets, net of cash and restricted cash acquired	$	120,203
Property and equipment		54,913
Intangible assets:		
In-process research and development		34,000
Developed technology		111,900
Customer relationships		116,000
Trade names		3,000
Goodwill		191,996
Other noncurrent assets		37,528
Deferred revenue		(4,369)
Other current liabilities		(146,618)
Deferred revenue, net of current		(3,726)
Deferred tax liability		(13,308)
Other long-term liabilities		(46,117)
	$	**455,402**

The valuation of the acquired intangible assets is inherently subjective and relies on significant unobservable inputs. The Company used an income approach to value the acquired in-process research and development, developed technology, customer relationships and trade name intangible assets. The valuation for each of these intangible assets was based on estimated projections of expected cash flows to be generated by the assets, discounted to the present value at discount rates commensurate with perceived risk. The valuation assumptions take into consideration the Company's estimates of customer attrition, technology obsolescence and revenue growth projections. The Company is amortizing the identifiable intangible assets arising from the ECI Acquisition in relation to the expected cash flows from the individual intangible assets over their respective useful lives, which have a weighted average life of 12.38 years (see Note 10). Goodwill results from assets that are not separately identifiable as part of the transaction and is not deductible for tax purposes.

Pro Forma Results

The following unaudited pro forma information presents the combined results of operations of Ribbon and ECI for the years ended December 31, 2020 and 2019 as if the ECI Acquisition had been completed on January 1, 2019, with adjustments to give effect to pro forma events that are directly attributable to the ECI Acquisition. These pro forma adjustments include an increase in research and development expense related to the conformance of ECI's cost capitalization policy to Ribbon's, additional amortization expense for the acquired identifiable intangible assets, a decrease in historical ECI interest expense reflecting the extinguishment of certain of ECI's debt as a result of the ECI Acquisition, and an increase in interest expense reflecting the new debt entered into by the Company in connection with the ECI Acquisition. Pro forma adjustments also include the elimination of acquisition- and integration-related costs directly attributable to the acquisition from the year ended December 31, 2020 and inclusion of such costs in the year ended December 31, 2019.

The unaudited pro forma results do not reflect any operating efficiencies or potential cost savings that may result from the consolidation of the operations of Ribbon and ECI. Accordingly, these unaudited pro forma results are presented for illustrative purposes and are not intended to represent or be indicative of the actual results of operations of the combined

company that would have been achieved had the ECI Acquisition occurred at January 1, 2019, nor are they intended to represent or be indicative of future results of operations (in thousands, except per share amounts):

	Year ended December 31,	
	2020	2019
	(unaudited)	
Revenue	$ 869,002	$ 944,915
Net income (loss)	$ 97,036	$ (250,337)
Diluted earnings (loss) per share	$ 0.65	$ (1.76)

Anova Data, Inc.

On the Anova Acquisition Date, the Company acquired the business and technology assets of Anova, a private company headquartered in Westford, Massachusetts that provides advanced analytics solutions (the "Anova Acquisition"). The Anova Acquisition was completed in accordance with the terms and conditions of an asset purchase agreement, dated as of January 31, 2019 (the "Anova Asset Purchase Agreement"). The Company acquired Anova because it believed that the Anova Acquisition would reinforce and extend Ribbon's strategy to expand into network optimization, security and data monetization via big data analytics and machine learning.

As consideration for the Anova Acquisition, Ribbon issued 2.9 million shares of Ribbon common stock with a fair value of $15.2 million to Anova's sellers and equity holders on the Anova Acquisition Date and held back an additional 0.3 million shares with a fair value of $1.7 million, of which 316,551 shares were issued after post-closing adjustments on March 4, 2020. The Anova Deferred Consideration was included as a component of Accrued expenses and other current liabilities in the Company's consolidated balance sheet at December 31, 2019.

The Anova Acquisition has been accounted for as a business combination and the financial results of Anova have been included in the Company's consolidated financial statements for the period subsequent to the Anova Acquisition Date. The results for the year ended December 31, 2019 are not significant to the Company's consolidated financial statements. The Company has not provided pro forma financial information, as the historical amounts are not significant to the Company's consolidated financial statements.

As of December 31, 2019, the valuation of acquired assets, identifiable intangible assets and certain assumed liabilities was final. The finalization of this valuation resulted in a refinement of the allocation of purchase price between the identifiable intangible assets arising from the transaction, resulting in a $2.0 million reduction to the customer relationships intangible asset and an increase of $2.0 million to the developed technology intangible asset. The purchase consideration aggregating $16.9 million has been allocated to $11.2 million of identifiable intangible assets, comprised of $5.2 million of customer relationships and $6.0 million of developed technology, and working capital items aggregating $0.2 million of net assets acquired. The remaining unallocated amount of $5.5 million has been recorded as goodwill.

The valuation of the acquired intangible assets is inherently subjective and relies on significant unobservable inputs. The Company used an income approach to value the acquired intangible assets relating to developed technology and customer relationships. The valuation for each of these intangible assets was based on estimated projections of expected cash flows to be generated by the assets, discounted to the present value at discount rates commensurate with perceived risk. The valuation assumptions take into consideration the Company's estimates of customer attrition, technology obsolescence and revenue growth projections. The Company is amortizing the identifiable intangible assets in relation to the expected cash flows from the individual intangible assets over their respective useful lives, which have a weighted average life of 6.25 years (see Note 10).

The excess of purchase consideration over net tangible and identifiable intangible assets acquired was recorded as goodwill. The goodwill is deductible for tax purposes.

Edgewater Networks, Inc.

On the Edgewater Acquisition Date, the Company completed its acquisition of Edgewater, a private company headquartered in San Jose, California. The Edgewater Acquisition was completed in accordance with the terms and conditions

of the Agreement and Plan of Merger, dated as of June 24, 2018, by and among Ribbon, Merger Sub, Edgewater and Shareholder Representative Services LLC, a Colorado limited liability company, solely in its capacity as the initial holder representative (the "Edgewater Merger Agreement"). The Company acquired Edgewater because it believed that Edgewater would allow Ribbon to offer its global customer base a complete core-to-edge product portfolio, end-to-end service assurance and analytics solutions, and a fully integrated software-defined SD-WAN service.

As consideration for the Edgewater Acquisition, Ribbon paid, in the aggregate, $46.4 million of cash, net of cash acquired, and issued 4.2 million shares of Ribbon common stock to Edgewater's selling shareholders and holders of vested in-the-money options and warrants to acquire common stock of Edgewater (the "Edgewater Selling Stakeholders") on the Edgewater Acquisition Date, with additional cash payments of $30 million, of which $15 million was to be paid 6 months from the closing date and the other $15 million was to be paid as early as 9 months from the closing date and no later than 18 months from the closing date (the exact timing of which would depend on the amount of revenue generated from the sales of Edgewater products in 2018) ("Edgewater Deferred Consideration").

On February 15, 2019, the Company and the Edgewater Selling Stakeholders agreed to reduce the amount of Edgewater Deferred Consideration from $30 million to $21.9 million and agreed that all such deferred consideration would be payable on March 8, 2019. The Company paid the Edgewater Selling Stakeholders $21.9 million on March 8, 2019 and recorded the reduction to the Edgewater Deferred Consideration of $8.1 million in Other income (expense), net, in the Company's consolidated statement of operations and as a non-cash adjustment to reconcile net loss to cash flows provided by operating activities in the Company's consolidated statement of cash flows for the year ended December 31, 2019.

The Edgewater Acquisition has been accounted for as a business combination and the financial results of Edgewater have been included in the Company's consolidated financial statements for the period subsequent to its acquisition.

The Company finalized the valuation of acquired assets, identifiable intangible assets and certain assumed liabilities in the second quarter of 2019. A summary of the allocation of the purchase consideration for Edgewater is as follows (in thousands):

Fair value of consideration transferred:		
Cash consideration:		
Cash paid to Edgewater Selling Stakeholders	$	51,162
Less cash acquired		(4,773)
Net cash consideration		46,389
Unpaid cash consideration		30,000
Fair value of Ribbon stock issued		30,000
Fair value of equity awards assumed (see Note 21)		747
Fair value of total consideration	$	107,136
Fair value of assets acquired and liabilities assumed:		
Current assets, net of cash acquired	$	16,098
Property and equipment		245
Intangible assets:		
Developed technology		29,500
Customer relationships		26,100
Trade names		1,100
Goodwill		48,053
Other noncurrent assets		103
Deferred revenue		(2,749)
Other current liabilities		(9,926)
Deferred revenue, net of current		(669)
Other long-term liabilities		(719)
	$	107,136

The valuation of the acquired intangible assets is inherently subjective and relies on significant unobservable inputs. The Company used an income approach to value the acquired developed technology, customer relationships and trade name

intangible assets. The valuation for each of these intangible assets was based on estimated projections of expected cash flows to be generated by the assets, discounted to the present value at discount rates commensurate with perceived risk. The valuation assumptions take into consideration the Company's estimates of customer attrition, technology obsolescence and revenue growth projections. The Company is amortizing the identifiable intangible assets arising from the Edgewater Acquisition in relation to the expected cash flows from the individual intangible assets over their respective useful lives, which have a weighted average life of 8.38 years (see Note 10). Goodwill resulting from the transaction is primarily due to expected synergies between the combined companies and is not deductible for tax purposes.

The Company's revenue for the year ended December 31, 2018 included $21.5 million of revenue and $4.3 million of net loss attributable to Edgewater since the Edgewater Acquisition Date. The Company has not provided pro forma financial information, as the historical amounts are not significant to the Company's consolidated financial statements.

Acquisition-, Disposal- and Integration-Related Expenses

Acquisition-related expenses include those expenses related to acquisitions that would otherwise not have been incurred by the Company, including professional and services fees, such as legal, audit, consulting, paying agent and other fees, and expenses related to cash payments to certain former executives of the acquired businesses in connection with their employment agreements. Disposal-related expenses are professional and services fees related to disposals of subsidiaries or portions of the business. Integration-related expenses represent incremental costs related to combining the Company and its business acquisitions, such as third-party consulting and other third-party services related to merging the previously separate companies' systems and processes.

The acquisition-related professional and services fees recorded in the year ended December 31, 2020 primarily related to the ECI Acquisition and the disposal-related expenses related to the Company's sale of the Kandy Communications Business. The acquisition-related professional and services fees recorded in the year ended December 31, 2019 primarily related to the ECI Acquisition and, to a lesser extent, to the Anova Acquisition and other acquisition-related activities. The acquisition-related professional and services fees recorded in the year ended December 31, 2018 primarily related to the 2017 merger between Sonus Networks, Inc. and GENBAND (the "GENBAND Merger"), with nominal amounts related to the acquisition of Edgewater and other acquisition-related activities.

The components of Acquisition-, disposal- and integration-related expenses incurred in the years ended December 31, 2020, 2019 and 2018 were as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Professional and services fees (acquisition-related)	$ 13,441	$ 8,657	$ 7,627
Management bonuses (acquisition-related)	—	—	1,972
Professional and services fees (disposal-related)	1,890	—	—
Integration-related expenses	1,833	4,296	7,352
	$ 17,164	$ 12,953	$ 16,951

(4) SALE OF KANDY COMMUNICATIONS BUSINESS

On August 5, 2020, the Company announced that it had entered into a definitive agreement (the "Kandy Purchase Agreement") with American Virtual Cloud Technologies, Inc. ("AVCT") to sell the Kandy Communications Business. Under the Kandy Purchase Agreement, AVCT would purchase the assets and assume certain liabilities associated with the Kandy Communications Business, as well as all of the outstanding interests in Kandy Communications LLC, a subsidiary of the Company (the "Kandy Sale").

On December 1, 2020, the Company and AVCT entered into an amended and restated Purchase Agreement (the “Amended Kandy Agreement”). Under the terms of the Amended Kandy Agreement, AVCT agreed to pay to Ribbon $45.0 million, subject to certain adjustments, in the form of units of AVCT’s securities (the “AVCT Units”), with each AVCT Unit consisting of: (i) $1,000 in principal amount of AVCT’s Series A-1 convertible debentures (the “Debentures”); and (ii) one warrant to

purchase 100 shares of AVCT common stock, $0.0001 par value (the “Warrants”), as consideration for the Kandy Sale (the "Kandy Consideration"). The Company received 43,778 AVCT Units as sale consideration on the Kandy Sale Date.

The Debentures bear interest at a rate of 10% per annum, which will be added to the principal amount of the Debentures, except upon maturity, in which case accrued and unpaid interest is payable in cash. The entire principal of each Debenture, together with accrued and unpaid interest thereon, is due and payable on the earlier of the May 1, 2023 maturity date or the occurrence of a Change in Control as defined in the Amended Kandy Agreement. Each Debenture is convertible, in whole or in part, at any time at the Company's option into that number of shares of AVCT common stock, calculated by dividing the principal amount being converted, together with all accrued and unpaid interest thereon, by the applicable conversion price, initially $3.45. The Debentures are subject to mandatory redemption if the AVCT stock price is at or above $6.00 per share for 40 trading days in any 60 consecutive trading day period, subject to the satisfaction of certain other conditions. The conversion price is subject to customary adjustments including, but not limited to, stock dividends, stock splits and reclassifications. At the Company's option, up to $5.0 million of the Debentures may be redeemed by AVCT at par in the event AVCT raises at least $50.0 million in its offering of AVCT Units. As of February 19, 2021, the stock price had traded above $6.00 for 40 days within a 60 consecutive trading day period, and accordingly, the Debentures will be converted to shares of AVCT common stock upon the completion of customary regulatory filings by AVCT.

The Warrants are independent of the Debentures and entitle the Company to purchase 4,377,800 shares of AVCT common stock at an exercise price of $0.01 per share. The Warrants expire on December 1, 2025, and were immediately exercisable on the Kandy Sale Date.

The Company had not redeemed any of the Debentures or exercised any of the Warrants as of December 31, 2020. The Company is also subject to a lock-up provision which limits the Company's ability to sell any shares of AVCT common stock underlying the Debentures and the Warrants prior to June 1, 2021, except in certain transactions.

The Company determined that the AVCT Units had a fair value of $84.9 million at the Kandy Sale Date, comprised of the Debentures with a fair value of $66.3 million and the Warrants with a fair value of $18.6 million. The value of the net assets sold to AVCT totaled $1.3 million, resulting in a gain on the sale of $83.6 million. The gain on the Kandy Sale is included as a component of Other income (expense), net, in the consolidated statement of operations for the year ended December 31, 2020.

The Company calculates the fair value of the Debentures using a Lattice-based valuation approach, which utilizes a binomial tree to model the different paths the price of AVCT's common stock might take over the Debentures' life by using assumptions regarding the stock price volatility and risk-free interest rate. These results are then used to calculate the fair value of the Debentures at each measurement date. The Company uses the Black-Scholes valuation model for estimating the fair value of the Warrants at each measurement date. The fair value of the Warrants is affected by AVCT's stock price as well as valuation assumptions, including the volatility of AVCT's stock price, expected term of the option, risk-free interest rate and expected dividends. Both the Lattice and Black-Scholes valuation models are based on available market data, giving consideration to all of the rights and obligations of each instrument and precluding the use of "blockage" discounts or premiums in determining the fair value of a large block of financial instruments.

The Company will calculate the fair value of the Debentures and Warrants at each quarter-end and record any adjustments to the fair values in Other income (expense), net. At December 31, 2020, the aggregate fair value of the Debentures and Warrants was $115.2 million, resulting in a gain of $30.3 million arising from the increase in fair values of the Debentures and Warrants for the period from the Kandy Sale Date to December 31, 2020. This gain is included as a component of Other income (expense), net, in the Company's consolidated statement of operations. The fair values of the Debentures and Warrants are reported as Investments in the Company's consolidated balance sheet at December 31, 2020 and are classified as Level 2 fair value measurements within the fair value hierarchy (see Note 6).

The assets acquired and liabilities assumed by AVCT in connection with the Kandy Sale were primarily comprised of accounts receivable, property and equipment, trade accounts payable and employee-related accruals. The Company incurred $1.9 million of transaction costs, which are included as a component of Acquisition-, disposal- and integration-related expense in the consolidated statement of operations for the year ended December 31, 2020. The results of the Kandy Communications Business are excluded from the Company's consolidated results for the period subsequent to the Kandy Sale Date.

(5) EARNINGS (LOSS) PER SHARE

Basic earnings (loss) per share is computed by dividing net income (loss) by the weighted average number of shares outstanding during the period. For periods in which the Company reports net income, diluted net income per share is determined by using the weighted average number of common and dilutive common equivalent shares outstanding during the period unless the effect is antidilutive.

The calculations of shares used to compute basic and diluted earnings (loss) per share are as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Weighted average shares outstanding—basic	138,967	109,734	103,916
Potential dilutive common shares	5,683	—	—
Weighted average shares outstanding—diluted	144,650	109,734	103,916

Options to purchase the Company's common stock aggregating 0.2 million shares have not been included in the computation of diluted earnings per share for the year ended December 31, 2020 because their effect would have been antidilutive. Options to purchase the Company's common stock and unvested shares of restricted and performance-based stock and stock units aggregating 4.6 million shares have not been included in the computation of diluted loss per share for the year ended December 31, 2019 because their effect would have been antidilutive. Options to purchase the Company's common stock, unvested shares of restricted and performance-based stock and stock units, and shares in connection with future purchases under the Company's Amended and Restated 2000 Employee Stock Purchase Plan, as amended (the "ESPP"), aggregating 3.1 million shares have not been included in the computation of diluted loss per share for the year ended December 31, 2019 because their effect would have been antidilutive.

(6) INVESTMENTS AND FAIR VALUE HIERARCHY

The Company's policy and historical practice has been to invest in debt instruments, primarily U.S. government-backed, municipal and corporate obligations, which management believes to be high quality (investment grade) credit instruments.

At December 31, 2020, the Company's investments were comprised of the Debentures and Warrants received as sale consideration for the Kandy Sale (see Note 4).

The Company did not hold any marketable securities at December 31, 2019, as its remaining available-for-sale marketable securities matured during the second quarter of 2019. As a result of the Company no longer holding any marketable securities or investments at December 31, 2019, the remaining tax effect on the unrealized gain on available-for-sale marketable securities was realized in the second quarter of 2019 and is included in the income tax provision in the Company's consolidated statement of operations for the year ended December 31, 2019 as a reclassification from Unrealized gain on available-for-sale marketable securities in the Company's consolidated statement of comprehensive loss. The Company had not sold any of its marketable securities in 2019 prior to their full maturity. During the year ended December 31, 2019, the Company recognized nominal gross gains and losses on the maturities of its marketable securities.

On a quarterly basis, the Company reviews its investments, if any, to determine if there have been any events that could create a credit impairment.

Fair Value Hierarchy

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or a liability. The three-tier fair value hierarchy is based on the level of independent, objective evidence surrounding the inputs used to measure fair value. A financial instrument's categorization within the fair value hierarchy is based upon the lowest level of input that is significant to the fair value measurement. The fair value hierarchy is as follows:

Level 1. Level 1 applies to assets or liabilities for which there are quoted prices in active markets for identical assets or liabilities.

Level 2. Level 2 applies to assets or liabilities for which there are inputs that are directly or indirectly observable in the marketplace, such as quoted prices for similar assets or liabilities in active markets or quoted prices for identical assets or liabilities in markets with insufficient volume or infrequent transactions (less active markets).

Level 3. Level 3 applies to assets or liabilities for which there are unobservable inputs to the valuation methodology that are significant to the measurement of the fair value of the assets or liabilities.

The classification of each asset or liability fair value measurement within the fair value hierarchy is determined based on the lowest level input that is significant to the fair value measurement in its entirety. Market activity is presumed to be orderly in the absence of evidence of forced or disorderly sales, although such sales may still be indicative of fair value. Applicable accounting guidance precludes the use of blockage factors or liquidity adjustments due to the quantity of securities held by an entity.

The Company's marketable securities, when applicable, are valued with the assistance of valuations provided by third-party pricing services, as derived from such services' pricing models. Inputs to the models may include, but are not limited to, reported trades, executable bid and asked prices, broker/dealer quotations, prices or yields of securities with similar characteristics, benchmark curves or information pertaining to the issuer, as well as industry and economic events. The pricing services may use a matrix approach, which considers information regarding securities with similar characteristics to determine the valuation for a security. The Company is ultimately responsible for the consolidated financial statements and underlying estimates. Accordingly, the Company assesses the reasonableness of the valuations provided by the third-party pricing services by reviewing actual trade data, broker/dealer quotes and other similar data, which are obtained from quoted market prices or other sources.

(7) ACCOUNTS RECEIVABLE, NET

Accounts receivable, net, consisted of the following (in thousands):

	December 31,	
	2020	2019
Accounts receivable	$ 238,514	$ 193,619
Allowance for doubtful accounts	(776)	(913)
Accounts receivable, net	$ 237,738	$ 192,706

The Company's allowance for doubtful accounts activity was as follows (in thousands):

Year ended December 31,	Balance at beginning of year	Charges to expense	Charges (credits) to other accounts	Write-offs	Balance at end of year
2020	$ 913	$ 686	$ 94	$ (917)	$ 776
2019	$ 669	$ 738	$ 68	$ (562)	$ 913
2018	$ 73	$ 351	$ 620	$ (375)	$ 669

(8) INVENTORY

Inventory consisted of the following (in thousands):

	December 31,	
	2020	2019
On-hand final assemblies and finished goods inventories	$ 46,921	$ 13,283
Deferred cost of goods sold	1,165	2,441
	48,086	15,724
Less noncurrent portion (included in Other assets)	(2,336)	(924)
Current portion	$ 45,750	$ 14,800

(9) PROPERTY AND EQUIPMENT

Property and equipment consisted of the following (in thousands):

		December 31,	
	Useful Life	2020	2019
Equipment	2-5 years	$ 90,885	$ 82,737
Software	2-5 years	32,244	27,939
Furniture and fixtures	3-5 years	3,092	1,283
Leasehold improvements	Shorter of the estimated lease term or useful life	37,263	23,975
		163,484	135,934
Less accumulated depreciation and amortization		(114,596)	(106,958)
Property and equipment, net		$ 48,888	$ 28,976

The Company recorded depreciation and amortization expense related to property and equipment of $17.2 million for the year ended December 31, 2020, $11.9 million for the year ended December 31, 2019 and $11.2 million for the year ended December 31, 2018. During each of the years ended December 31, 2020, 2019 and 2018, the Company disposed of certain property and equipment that was fully depreciated at the time of disposal, which resulted in reductions in both Cost and Accumulated depreciation.

Property and equipment under finance leases included in the amounts above were as follows (in thousands):

	December 31,	
	2020	2019
Cost	$ 2,908	$ 4,401
Less accumulated depreciation	(1,925)	(1,981)
Property and equipment under finance leases, net	$ 983	$ 2,420

The net book values of the Company's property and equipment by geographic area were as follows (in thousands):

	December 31,	
	2020	2019
United States	$ 27,211	$ 17,584
Canada	4,584	4,768
Asia/Pacific	6,078	5,146
Europe	1,171	1,204
Israel	9,613	20
Other	231	254
	$ 48,888	$ 28,976

(10) INTANGIBLE ASSETS AND GOODWILL

The Company's intangible assets at December 31, 2020 and 2019 consisted of the following (in thousands):

December 31, 2020	Weighted average amortization period (years)	Cost	Accumulated amortization	Net carrying value
In-process research and development	*	$ 34,000	$ —	$ 34,000
Developed technology	7.93	306,380	143,050	163,330
Customer relationships	11.86	268,140	50,627	217,513
Trade names	3.88	5,000	2,487	2,513
Internal use software	3.00	730	730	—
	9.17	$ 614,250	$ 196,894	$ 417,356

December 31, 2019	Weighted average amortization period (years)	Cost	Accumulated amortization	Net carrying value
In-process research and development	*	$ 5,600	$ —	$ 5,600
Developed technology	6.79	188,880	100,760	88,120
Customer relationships	9.46	152,140	33,350	118,790
Trade names	5.20	2,000	1,144	856
Internal use software	3.00	730	730	—
	7.82	$ 349,350	$ 135,984	$ 213,366

* An in-process research and development intangible asset has an indefinite life until the product is generally available, at which time such asset is typically reclassified to developed technology, at which time the Company begins to amortize the asset. In the fourth quarter of 2020, the Company reclassified an in-process research and development intangible asset related to developed technology, as the associated product became generally available.

As previously discussed (see Note 2), for the year ended December 31, 2020, the Company reclassified amounts recorded for amortization of acquired intangible assets in prior period presentations from Cost of revenue - product and Sales and marketing expense to a separate line included in operating expenses in the consolidated statements of operations. Amounts reported as Amortization of acquired intangible assets for the years ended December 31, 2020, 2019 and 2018 were $60.9 million, $49.2 million and $49.7 million, respectively.

Estimated future amortization expense for the Company's intangible assets at December 31, 2020 was as follows (in thousands):

Years ending December 31,	
2021	$ 66,626
2022	60,104
2023	52,256
2024	44,048
2025	37,027
Thereafter	157,295
	$ 417,356

Goodwill is recorded when the consideration for an acquisition exceeds the fair value of net tangible and identifiable intangible assets acquired. Effective in 2020, the Company's annual test for impairment of goodwill is completed as of October 1. Previously, the Company's annual test for impairment of goodwill was completed as of November 30.

As previously discussed, effective in the fourth quarter of 2020, the Company determined that it has two operating segments: Cloud and Edge, and IP Optical Networks. For the purpose of testing goodwill for impairment, all goodwill is

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

assigned to a reporting unit, which may be either an operating segment or a portion of an operating segment. The Company's reporting units are its operating segments. The Company determined that the goodwill assigned to the Cloud and Edge reporting unit was $224.9 million and the goodwill assigned to the IP Optical Networks reporting unit was $192.0 million. Upon completion of the Company's 2020 annual test for goodwill impairment, the Company determined that there was no impairment of goodwill in either of its reporting units.

Prior to the fourth quarter of 2020, the Company operated as a single operating segment with one reporting unit and consequently evaluated goodwill for impairment based on an evaluation of the fair value of the Company as a whole. Based on the results of the Company's 2019 annual impairment test, the Company determined that its carrying value exceeded its fair value and accordingly, the Company recorded an impairment charge of $164.3 million.

The Company performed its assessment for the year ended December 31, 2018 and determined that its fair value was in excess of its carrying value and accordingly, there was no impairment of goodwill.

At certain times during the years ended December 31, 2020, 2019 and 2018, including at the Company's annual test date in 2018, the Company's market capitalization was below its book value. While the Company had concluded that its fair value exceeded its carrying value at that date, the Company regularly monitored for changes in circumstances, including changes to the Company's performance, that could result in impairment of goodwill.

The changes in the carrying value of the Company's goodwill in the years ended December 31, 2020 and 2019 were as follows (in thousands):

	Cloud and Edge	IP Optical Networks	Total
Balance at December 31, 2018 (1)	$ 383,655	$ —	$ 383,655
Acquisition of Anova	5,541	—	5,541
Impairment of goodwill	(164,300)	—	(164,300)
Balance at December 31, 2019 (2)	224,896	—	224,896
Acquisition of ECI	—	191,996	191,996
Balance at December 31, 2020 (2)	$ 224,896	$ 191,996	$ 416,892

(1) Balance is presented net of accumulated impairment losses of $3.1 million for the Cloud and Edge segment.
(2) Balance is presented net of accumulated impairment losses of $167.4 million for the Cloud and Edge segment.

The components of goodwill at December 31, 2020 and 2019 were as follows (in thousands):

	Cloud and Edge	IP Optical Networks	Total
Balance at December 31, 2019			
Goodwill	$ 392,302	$ —	$ 392,302
Accumulated impairment losses	(167,406)	—	(167,406)
	224,896	—	224,896
Balance at December 31, 2020			
Goodwill	$ 392,302	$ 191,996	$ 584,298
Accumulated impairment losses	(167,406)	—	(167,406)
	$ 224,896	$ 191,996	$ 416,892

(11) ACCRUED EXPENSES AND OTHER

Accrued expenses and other consisted of the following (in thousands):

	December 31, 2020	December 31, 2019
Employee compensation and related costs	$ 66,039	$ 27,166
Professional fees	11,451	13,331
Other	57,375	16,203
	$ 134,865	$ 56,700

(12) WARRANTY

The changes in the Company's warranty accrual balance in the year ended December 31, 2020 were as follows (in thousands):

Year ended December 31,	Balance at beginning of year	Assumed liability in connection with ECI Acquisition	Provision	Settlements	Balance at end of year
2020	$ —	$ 16,251	$ 4,687	$ (6,083)	$ 14,855

(13) RESTRUCTURING AND FACILITIES CONSOLIDATION INITIATIVES

The Company recorded restructuring and related expense aggregating $16.2 million in the year ended December 31, 2020, $16.4 million in the year ended December 31, 2019 and $17.0 million in the year ended December 31, 2018. Restructuring and related expense includes restructuring expense (primarily severance and related costs), estimated future variable lease costs for vacated properties with no intent or ability of sublease, and accelerated rent amortization expense.

For restructuring events that involve lease assets and liabilities, the Company applies lease reassessment and modification guidance and evaluates the right-of-use assets for potential impairment. If the Company plans to exit all or distinct portions of a facility and does not have the ability or intent to sublease, the Company will accelerate the amortization of each of those lease components through the vacate date. The accelerated amortization is recorded as a component of Restructuring and related expense in the Company's consolidated statements of operations. Related variable lease expenses will continue to be expensed as incurred through the vacate date, at which time the Company will reassess the liability balance to ensure it appropriately reflects the remaining liability associated with the premises and record a liability for the estimated future variable lease costs.

Accelerated amortization of lease assets is recognized from the date that the Company commences the plan to fully or partially vacate a facility, for which there is no intent or ability to enter into a sublease, through the final vacate date. Amounts of accelerated rent amortization that are included as a component of restructuring and related expense are not included in the tables below, as the liability for the total lease payments for each respective facility is included as a component of Operating lease liabilities in the Company's consolidated balance sheets at December 31, 2020 and 2019, both current and noncurrent (see Note 22). The Company may incur additional future expense if it is unable to sublease other locations included in the Facilities Initiative.

The components of restructuring and related expense for the year ended December 31, 2020 and 2019 were as follows (in thousands):

	Year ended December 31,	
	2020	2019
Severance and related costs	$ 12,025	$ 11,179
Variable and other facilities-related costs	3,605	1,528
Accelerated amortization of lease assets due to cease-use	605	3,692
	$ 16,235	$ 16,399

Prior to the adoption of ASC 842, the Company recorded restructuring accruals for future lease obligations related to vacated facilities at the time that it ceased usage of the respective facility. The components of Restructuring and related expense recorded in the year ended December 31, 2018 were as follows (in thousands):

Severance and related costs	15,217
Facilities	1,798
	$ 17,015

2020 Restructuring Initiative

In 2020, the Company implemented a restructuring plan to eliminate certain positions and redundant facilities, primarily in connection with the ECI Acquisition, to further streamline the Company's global footprint and improve its operations (the "2020 Restructuring Initiative"). The 2020 Restructuring Initiative includes facility consolidations and a reduction in workforce, including three former executives of ECI for whom severance aggregating $1.1 million was recorded in the first quarter of 2020. In connection with this initiative, the Company expects to eliminate duplicate functions arising from the ECI Acquisition and support its efforts to integrate the two companies.

The Company recorded restructuring expense of $14.0 million in connection with the 2020 Restructuring Initiative in the year ended December 31, 2020, comprised of $11.5 million for severance and related costs for approximately 190 employees, including the aforementioned former executives of ECI, $2.0 million for variable and other facilities-related costs, and $0.5 million for accelerated amortization of lease assets. The Company expects these amounts will be fully paid in 2021. The Company expects that it will record additional restructuring and related expense approximating $8 million under the 2020 Restructuring Initiative in the aggregate for severance and planned facility consolidations. A summary of the 2020 Restructuring Initiative accrual activity for the year ended December 31, 2020 is as follows (in thousands):

	Balance at January 1, 2020	Initiatives charged to expense	Transfer to operating lease liability accounts	Cash payments	Balance at December 31, 2020
Severance	$ —	$ 11,547	$ —	$ (6,310)	5,237
Facilities	—	2,478	(535)	(687)	1,256
	$ —	$ 14,025	$ (535)	$ (6,997)	$ 6,493

2019 Restructuring and Facilities Consolidation Initiative

In June 2019, the Company implemented a restructuring plan to further streamline the Company's global footprint, improve its operations and enhance its customer delivery (the "2019 Restructuring Initiative"). The 2019 Restructuring Initiative includes facility consolidations, refinement of the Company's research and development activities, and a reduction in workforce. The facility consolidations under the 2019 Restructuring Initiative (the "Facilities Initiative") include a consolidation of the Company's North Texas sites into a single campus, housing engineering, customer training and support, and administrative functions, as well as a reduction or elimination of certain excess and duplicative facilities worldwide. In addition, the Company is substantially consolidating its global software laboratories and server farms into two lower cost North American sites. The Company continues to evaluate its properties included in the Facilities Initiative for accelerated amortization and/or right-of-use asset impairment. The Company expects that the actions under the Facilities Initiative will be completed in 2021.

In connection with the 2019 Restructuring Initiative, the Company recorded restructuring and related expense of $2.3 million and $11.2 million in the years ended December 31, 2020 and 2019, respectively. The amount recorded in the

current year was comprised of $0.5 million for severance and related costs for approximately 5 employees, $1.7 million for variable and other facilities-related costs and $0.1 million for accelerated amortization of lease assets. The amount recorded in the year ended December 31, 2019 was comprised of $6.1 million for severance and related costs for approximately 120 employees, $1.4 million for variable and other facilities-related costs and $3.7 million for accelerated amortization of lease assets. The Company expects that all of the amount accrued for severance and related costs will be paid in 2021. The Company estimates that it will record nominal, if any, additional restructuring and related expense related to severance and related costs under the 2019 Restructuring Initiative.

Summaries of the 2019 Restructuring Initiative accrual activity for the years ended December 31, 2020 and 2019 are as follows (in thousands):

Year ended December 31, 2020	Balance at January 1, 2020	Initiatives charged to expense	Transfer to operating lease liability accounts	Cash payments	Balance at December 31, 2020
Severance	$ 2,110	$ 536	$ —	$ (2,473)	173
Facilities	991	1,732	(70)	(1,887)	766
	$ 3,101	$ 2,268	$ (70)	$ (4,360)	$ 939

Year ended December 31, 2019	Balance at January 1, 2019	Initiatives charged to expense	Transfer to operating lease liability accounts	Cash payments	Balance at December 31, 2019
Severance	$ —	$ 6,103	—	$ (3,993)	2,110
Facilities	—	5,064	(3,692)	(381)	991
	$ —	$ 11,167	(3,692)	$ (4,374)	$ 3,101

Merger Restructuring Initiative

In connection with the GENBAND Merger, the Company implemented a restructuring plan in the fourth quarter of 2017 to eliminate certain redundant positions and facilities within the combined companies (the "Merger Restructuring Initiative"). In connection with this initiative, the Company recorded $5.2 million of restructuring and related expense in 2019, virtually all of which was for severance and related costs for approximately 40 employees. The Company recorded $16.1 million of restructuring and related expense in 2018 in connection with this initiative, comprised of $14.7 million for severance for approximately 275 employees and $1.4 million for redundant facilities in the Czech Republic, Canada and the U.S. The Merger Restructuring Initiative was completed in 2020.

Summaries of the Merger Restructuring Initiative accrual activity for the years ended December 31, 2020 and 2019 are as follows (in thousands):

Year ended December 31, 2020	Balance at January 1, 2020	Adjustments for changes in estimate	Cash payments	Balance at December 31, 2020
Severance	$ 409	$ (58)	$ (351)	$ —

Year ended December 31, 2019	Balance at January 1, 2019	Initiatives charged to expense	Adjustment for the impact of ASC 842 adoption	Cash payments	Balance at December 31, 2019
Severance	$ 1,910	$ 5,076	$ —	$ (6,577)	$ 409
Facilities	771	156	(771)	(156)	—
	$ 2,681	$ 5,232	$ (771)	$ (6,733)	$ 409

Assumed Restructuring Initiative

The Company assumed GENBAND's previously recorded restructuring liability, totaling $4.1 million, on the GENBAND Merger Date (the "GENBAND Restructuring Initiative"). Of this amount, $3.7 million related to severance and related costs

and $0.4 million related to facilities. Subsequent to the GENBAND Merger, the Company recorded $0.6 million in the aggregate in connection with the GENBAND Restructuring Initiative, comprised of $0.9 million of restructuring and related expense in 2018 and a credit of $0.3 million to restructuring and related expense in 2017 for changes in estimated costs for this previously recorded and assumed restructuring initiative. The GENBAND Restructuring Initiative was completed in 2019. In connection with the adoption of ASC 842, which was effective on January 1, 2019, the Company wrote off the remaining restructuring accrual related to facilities, as indicated in the table below (in thousands):

Year ended December 31, 2019	Balance at January 1, 2019	Adjustment for the impact of ASC 842 adoption	Balance at December 31, 2019
Facilities	$ 117	$ (117)	$ —

2016 Restructuring Initiative

In July 2016, the Company announced a program (the "2016 Restructuring Initiative") to further accelerate its investment in new technologies to address the communications industry's migration to a cloud-based architecture and to support the Company's strategic initiatives, such as new products and an expanded go-to-market footprint in selected geographies and discrete vertical markets. The Company recorded $2.0 million of restructuring and related expense in the aggregate in connection with this initiative, comprised of $1.9 million for severance and related costs and $0.1 million to abandon its facility in Rochester, New York (the "Rochester Facility"). The actions under the 2016 Restructuring Initiative were completed in 2019.

A summary of the 2016 Restructuring Initiative accrual activity for the year ended December 31, 2019 is as follows (in thousands):

Year ended December 31, 2019	Balance at January 1, 2019	Cash payments	Balance at December 31, 2019
Facilities	$ 58	$ (58)	$ —

Balance Sheet Classification

The current portions of accrued restructuring were $6.6 million and $2.6 million at December 31, 2020 and 2019, respectively, and are included as components of Accrued expenses in the consolidated balance sheets. The long-term portions of accrued restructuring are included as components of Other long-term liabilities in the consolidated balance sheets. The long-term portions of accrued restructuring were $0.8 million at December 31, 2020 and $0.9 million at December 31, 2019. The amount recorded as long-term at December 31, 2018 represented future lease payments on restructured facilities.

(14) DEBT

2018 Credit Facility

On June 24, 2018, the Company amended its previous outstanding credit facility to, among other things, permit the Edgewater Acquisition and related transactions (the "2018 Credit Facility"). The indebtedness and other obligations under the 2018 Credit Facility were unconditionally guaranteed on a senior secured basis by the Company and each other material U.S. domestic subsidiary of the Company (collectively, the "Guarantors"). The 2018 Credit Facility was secured by first-priority liens on substantially all of the assets of the Borrower and the Guarantors, including the Company.

The 2018 Credit Facility required periodic interest payments on outstanding borrowings until maturity. The Borrower could prepay all revolving loans under the 2018 Credit Facility at any time without premium or penalty (other than customary LIBOR breakage costs), subject to certain notice requirements.

Revolving loans under the 2018 Credit Facility bore interest at the Borrower's option at either the Eurodollar (LIBOR) rate plus a margin ranging from 2.50% to 3.00% per year or the base rate (the highest of the Federal Funds rate plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal) plus a margin ranging from 1.50% to 2.00% per year (such margins being referred to as the "Applicable Margin"). The Applicable Margin varied depending on the Company's consolidated leverage ratio (as defined in the 2018 Credit Facility). The base rate and the LIBOR rate were each subject to a zero percent floor.

The Borrower was charged a commitment fee ranging from 0.25% to 0.40% per year on the daily amount of the unused portions of the commitments under the 2018 Credit Facility. Additionally, with respect to all letters of credit outstanding under the 2018 Credit Facility, the Borrower was charged a fronting fee of 0.125% per year and an outstanding letter of credit fee equal to the Applicable Margin for base rate loans ranging from 1.50% to 2.00% times the amount of the outstanding letters of credit.

The 2018 Credit Facility required compliance with certain financial covenants, including a minimum consolidated quick ratio, minimum consolidated interest coverage ratio and maximum consolidated leverage ratio, all of which were defined in the 2018 Credit Facility and tested on a quarterly basis. In addition, the 2018 Credit Facility contained various covenants that, among other restrictions, limited the Company's and its subsidiaries' ability to enter into certain types of transactions, including, but not limited to: incurring or assuming indebtedness, making acquisitions or engaging in mergers, making investments, repurchasing equity and paying dividends, selling or otherwise transferring assets, changing the nature of its business and amending or making prepayments on certain junior debt.

The 2018 Credit Facility contained events of default that are customary for a secured credit facility. If an event of default relating to bankruptcy or other insolvency events with respect to a borrower occurred, all obligations under the 2018 Credit Facility would immediately become due and payable. If any other event of default existed under the 2018 Credit Facility, the lenders could accelerate the maturity of the obligations outstanding under the 2018 Credit Facility and exercise other rights and remedies, including charging a default rate of interest equal to 2.00% per year above the rate that would otherwise be applicable. In addition, if any event of default existed under the 2018 Credit Facility, the lenders could commence foreclosure or other actions against the collateral.

If any default existed under the 2018 Credit Facility, or if the Borrower was unable to make any of the representations and warranties as stated in the 2018 Credit Facility at the applicable time, the Borrower would be unable to borrow funds or have letters of credit issued under the 2018 Credit Facility, which, depending on the circumstances prevailing at that time, could have a material adverse effect on the Borrower's liquidity and working capital.

The 2018 Credit Facility was superseded by the 2019 Credit Facility, which was entered into on April 29, 2019 and which is discussed below.

2019 Credit Facility

On April 29, 2019, the Company, as guarantor, and Ribbon Communications Operating Company, Inc., as borrower, entered into a syndicated, amended and restated credit facility (the "2019 Credit Facility"), which provided for a $50 million term loan facility that was advanced in full on April 29, 2019, and a $100 million revolving line of credit. The 2019 Credit Facility also included procedures for additional financial institutions to become syndicate lenders, or for any existing lender to increase its commitment under either the term loan facility or the revolving loan facility, subject to an aggregate increase of $75 million for incremental commitments under the 2019 Credit Facility. The 2019 Credit Facility was scheduled to mature in April 2024. At December 31, 2019, the Company had an outstanding term loan debt balance of $48.8 million and an outstanding revolving line of credit balance of $8.0 million with a combined average interest rate of 3.30%, and $5.4 million of outstanding letters of credit at an interest rate of 1.50%.

The indebtedness and other obligations under the 2019 Credit Facility were unconditionally guaranteed on a senior secured basis by the Company and each other material U.S. domestic subsidiary of the Company (collectively, the "Guarantors"). The 2019 Credit Facility was secured by first-priority liens on substantially all of the assets of the Borrower and the Guarantors, including the Company.

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Notes to Consolidated Financial Statements (Continued)

The 2019 Credit Facility required periodic interest payments on any outstanding borrowings under the facility. The Borrower could prepay all revolving loans under the 2019 Credit Facility at any time without premium or penalty (other than customary LIBOR breakage costs), subject to certain notice requirements.

Revolving loans under the 2019 Credit Facility bore interest at the Borrower's option at either the Eurodollar (LIBOR) rate plus a margin ranging from 1.50% to 3.00% per year or the base rate (the highest of the Federal Funds rate plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal) plus a margin ranging from 0.50% to 2.00% per year (such margins being referred to as the "Applicable Margin"). The Applicable Margin varied depending on the Company's consolidated leverage ratio (as defined in the 2019 Credit Facility). The base rate and the LIBOR rate were each subject to a zero percent floor.

The 2019 Credit Facility required compliance with certain financial covenants, including a minimum consolidated quick ratio, minimum consolidated fixed charge coverage ratio and maximum consolidated leverage ratio, all of which were defined in the 2019 Credit Facility and tested on a quarterly basis. The Company was in compliance with all covenants of the 2019 Credit Facility at December 31, 2019.

In addition, the 2019 Credit Facility contained various covenants that, among other restrictions, limited the Company's and its subsidiaries' ability to enter into certain types of transactions, including, but not limited to: incurring or assuming indebtedness; granting or assuming liens; making acquisitions or engaging in mergers; making dividend and certain other restricted payments; making investments; selling or otherwise transferring assets; engaging in transactions with affiliates; entering into sale and leaseback transactions; entering into burdensome agreements; changing the nature of its business; modifying its organizational documents; and amending or making prepayments on certain junior debt.

The 2019 Credit Facility contained events of default that are customary for a secured credit facility. If an event of default relating to bankruptcy or other insolvency events with respect to a borrower occurred, all obligations under the 2019 Credit Facility would immediately become due and payable. If any other event of default existed under the 2019 Credit Facility, the lenders could accelerate the maturity of the obligations outstanding under the 2019 Credit Facility and exercise other rights and remedies, including charging a default rate of interest equal to 2.00% per year above the rate that would otherwise be applicable. In addition, if any event of default existed under the 2019 Credit Facility, the lenders could commence foreclosure or other actions against the collateral.

If any default existed under the 2019 Credit Facility, or if the Borrower was unable to make any of the representations and warranties as stated in the 2019 Credit Facility at the applicable time, the Borrower would be unable to borrow funds or have letters of credit issued under the 2019 Credit Facility, which, depending on the circumstances prevailing at that time, could have had a material adverse effect on the Borrower's liquidity and working capital.

The 2019 Credit Facility was superseded by the 2020 Credit Facility, which was entered into on March 3, 2020, and which is discussed below.

2020 Credit Facility

On March 3, 2020, the Company entered into a Senior Secured Credit Facilities Credit Agreement (as amended, the "2020 Credit Facility"), by and among the Company, as a guarantor, Ribbon Communications Operating Company, Inc., as the borrower ("Borrower"), Citizens Bank, N.A. ("Citizens"), as administrative agent, a lender, issuing lender, swingline lender, joint lead arranger and bookrunner, Santander Bank, N.A., as a lender, joint lead arranger and bookrunner, and the other lenders party thereto (each, together with Citizens Bank, N.A. and Santander Bank, N.A., referred to individually as a "Lender", and collectively, the "Lenders"). The proceeds of the Credit Agreement were used, in part, to pay off in full all obligations of the Company under the 2019 Credit Facility.

The 2020 Credit Facility provides for $500 million of commitments from the Lenders to the Borrower, comprised of $400 million in term loans (the "2020 Term Loan Facility") and a $100 million facility available for revolving loans (the "2020 Revolving Credit Facility"). Under the 2020 Revolving Credit Facility, a $30 million sublimit is available for letters of credit and a $20 million submit is available for swingline loans. Under the 2020 Credit Facility, the Company was originally required to make quarterly principal payments aggregating approximately $10 million in the first year, $20 million per year for the

following three years, and $30 million in the last year, with the remaining balance due on the maturity date. The 2020 Credit Facility also requires periodic interest payments until maturity.

The indebtedness and other obligations under the 2020 Credit Facility are unconditionally guaranteed on a senior secured basis by the Company, Edgewater Networks, Inc., a wholly-owned subsidiary of the Company, and GENBAND Inc., wholly-owned subsidiary of the Company (together, the "Guarantors"). The facilities under the 2020 Credit Facility are secured by first-priority liens on substantially all of the assets of the Borrower and the Guarantors, including substantially all of the assets of the Company.

The 2020 Credit Facility requires compliance with certain financial covenants, including a minimum Consolidated Fixed Charge Coverage Ratio and a maximum Consolidated Net Leverage Ratio (each as defined in the 2020 Credit Facility, and each tested on a quarterly basis).

In addition, the 2020 Credit Facility contains various covenants that, among other restrictions, limit the Company's and its subsidiaries' ability to incur or assume indebtedness; grant or assume liens; make acquisitions or engage in mergers; sell, transfer, assign or convey assets; repurchase equity and make dividend and certain other restricted payments; make investments; engage in transactions with affiliates; enter into sale and leaseback transactions; enter into burdensome agreements; change the nature of its business; modify their organizational documents; and amend or make prepayments on certain junior debt.

The 2020 Credit Facility contains events of default that are customary for a secured credit facility. If an event of default relating to bankruptcy or other insolvency events with respect to the Company or any of its subsidiaries occurs, all obligations under the 2020 Credit Facility will immediately become due and payable. If any other event of default occurs under the 2020 Credit Facility, the lenders may accelerate the maturity of the obligations outstanding under the 2020 Credit Facility and exercise other rights and remedies, including charging a default rate of interest equal to 2.00% per year above the rate that would otherwise be applicable. In addition, if any event of default exists under the 2020 Credit Facility, the lenders can commence foreclosure or other actions against the collateral.

On August 18, 2020 (the "First Amendment Effective Date"), the Borrowers entered into a First Amendment to the 2020 Credit Facility (the "First Amendment"). Pursuant to an assignment and assumption agreement entered into by Citizens and certain affiliates of Whitehorse Capital on the First Amendment Date (collectively, "HIG Whitehorse"), and consented to by Citizens and the Borrower, $75 million of the 2020 Term Loan Facility, designated as the Term B Loan (the "Term B Loan"), was assigned from Citizens to HIG Whitehorse as of August 18, 2020. The remaining $325 million of the 2020 Term Loan Facility that was not assigned to HIG Whitehorse was deemed the Term A Loan (the "Term A Loan" and, together with the Term B Loan, the "Amended 2020 Term Loan Facility").

The Term A Loan and the 2020 Revolving Credit Facility mature in March 2025. The Term A Loan and 2020 Revolving Credit Facility bear interest at the Borrower's option at either the LIBOR rate plus a margin ranging from 1.50% to 3.50% per year, or the base rate (the highest of the Federal Funds Effective Rate (as defined in the 2020 Credit Facility) plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal) plus a margin ranging from 0.50% to 2.50% per year (the "Applicable Margin"). The Applicable Margin varies depending on the Company's Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility). The base rate and the LIBOR rate are each subject to a zero percent floor. The Company is required to make quarterly principal payments on the Term A Loan aggregating approximately $10 million in the first year, $16 million per year in each of the next two years, $20 million in the fourth year and $16 million in the last year, with the final payment approximating $244 million due on the maturity date. The Borrower can prepay all amounts under the Term A Loan and the 2020 Revolving Credit Facility at any time without premium or penalty (other than customary LIBOR breakage costs), subject to certain notice requirements.

The Term B Loan is scheduled to mature in March 2026 and bears interest, at the Borrower's option, at either the LIBOR rate plus a margin of 7.50% per year, or the base rate (the highest of the Federal Funds Effective Rate (as defined in the First Amendment) plus 0.50%, or the prime rate announced from time to time in The Wall Street Journal, plus a margin of 6.50% per year. The Term B Loan has a lower rate of amortization than the Term A Loan and is subject to a 1.0% premium if voluntarily repaid in connection with a repricing transaction (as defined in the 2020 Credit Facility) occurring prior to the six month anniversary of the First Amendment Effective Date. The Company is required to make quarterly principal payments totaling approximately $1 million in the first year and $8 million in the aggregate over the next four and a half years, with the final payment approximating $66 million.

The First Amendment reduced the Borrower's ability to incur new tranches of term loans, or increases in commitments under the Amended 2020 Term Loan Facility or the 2020 Revolving Credit Facility. Specifically, such indebtedness can be incurred up to an aggregate dollar amount equal to 75% of the Company's Consolidated Adjusted EBITDA (as defined in the 2020 Credit Facility), reduced from 100% prior to the First Amendment, as of the most recently ended fiscal quarter for which financial statements have been delivered to the lenders, plus additional amounts, so long as the Borrower's Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility) does not exceed 2.25:1.00, reduced from 2.75:1.00 under the 2020 Credit Facility. The First Amendment also reduced the amount of Unrestricted Cash (as defined in the 2020 Credit Facility) used in calculating the Borrower's Consolidated Net Leverage Ratio from $25 million to $10 million.

On December 1, 2020, the Borrowers entered into a Second Amendment to the 2020 Credit Facility to obtain consent for an equity exchange with AVCT in connection with the Kandy Sale, as well as to amend certain other provisions of the 2020 Credit Facility.

At December 31, 2020, the Company had an outstanding Term A Loan balance of $318.5 million at an average interest rate of 3.4%, and an outstanding Term B Loan balance of $74.6 million at an average interest rate of 8.4%. The 2020 Revolving Credit Facility did not have an outstanding balance but had $5.6 million of letters of credit outstanding with an interest rate of 2.5%. The Company was in compliance with all covenants of the 2020 Credit Facility at December 31, 2020.

Short-Term Loan

From time to time, the Company may enter into uncommitted and unsecured short-term loans which it uses for financing exports in China. Three of these loans, aggregating $3.5 million at a weighted average interest rate of 3.97%, were entered into in March 2020, two of which were with China Zheshang Bank and one of which was with Bank of Communications Hangzhou Branch. These loans expired and were paid in full at various dates in June and July 2020. In July 2020, the Company entered into an uncommitted and unsecured short-term loan in the amount of $0.7 million at an interest rate of 4.0% with Bank of Communications Hangzhou Branch. This loan expired and was paid in full in November 2020.

Letters of Credit and Performance and Bid Bonds

The Company uses letters of credit and performance and bid bonds in the course of its business. At December 31, 2020, the Company had $32.6 million of letters of credit, bank guarantees, and performance and bid bonds outstanding (collectively, "Guarantees"), comprised of the $5.6 million of letters of credit under the 2020 Credit Agreement described above and $27.0 million of Guarantees under various uncommitted facilities. At December 31, 2020, the Company had cash collateral of $2.7 million supporting the Guarantees under its uncommitted facilities, which is included in Restricted cash in the consolidated balance sheet at December 31, 2020.

Promissory Note

In connection with the GENBAND Merger, on October 27, 2017, the Company issued a promissory note for $22.5 million to certain of GENBAND's equityholders (the "Promissory Note"). The Promissory Note did not amortize and the principal thereon was payable in full on the third anniversary of its execution. Interest on the Promissory Note was payable quarterly in arrears and accrued at a rate of 7.5% per year for the first six months after issuance, and thereafter at a rate of 10% per year. Interest that was not paid on the interest payment date would increase the principal amount of the Promissory Note. On April 29, 2019, concurrently with the closing of the 2019 Credit Facility as discussed above, the Company repaid in full all outstanding amounts under the Promissory Note, aggregating $24.7 million. The Company did not incur any early termination penalties in connection with this repayment.

(15) OTHER LONG-TERM LIABILITIES

Other long-term liabilities consisted of the following (in thousands):

	December 31,	
	2020	2019
Finance lease obligations	$ 1,469	$ 3,149
Restructuring	7,432	3,510
Pension obligations	11,132	9,954
Taxes payable	13,835	1,991
Interest rate swap	10,948	—
Warranty	14,855	—
Other	6,082	1,683
	65,753	20,287
Current portion	(17,472)	(3,698)
Long-term liabilities, net of current portion	$ 48,281	$ 16,589

The current portions of long-term liabilities are included as components of Accrued expenses and other in the Company's consolidated balance sheets.

(16) DERIVATIVE INSTRUMENTS AND HEDGING ACTIVITIES

The Company is exposed to financial market risk related to foreign currency fluctuations and changes in interest rates. These exposures are actively monitored by management. To manage the volatility related to the exposure to changes in interest rates, the Company has entered into a derivative financial instrument. Management's objective is to reduce, where it is deemed appropriate to do so, fluctuations in earnings and cash flows associated with changes in interest rates. Ribbon's policies and practices are to use derivative financial instruments only to the extent necessary to manage exposures. Ribbon does not hold or issue derivative financial instruments for trading or speculative purposes.

The Company records derivatives on the balance sheet at fair value. The accounting for changes in the fair value of derivatives depends on the intended use of the derivative, whether the Company has elected to designate a derivative in a hedging relationship and apply hedge accounting and whether the hedging relationship has satisfied the criteria necessary to apply hedge accounting. Derivatives designated and qualifying as a hedge of the exposure to changes in the fair value of an asset, liability, or firm commitment attributable to a specific risk, such as interest rate risk, are considered fair value hedges. Derivatives designated and qualifying as a hedge of the exposure to variability in expected future cash flows, or other types of forecasted transactions, are considered cash flow hedges. Derivatives may also be designated as hedges of the foreign currency exposure of a net investment in a foreign operation. Hedge accounting generally provides for the matching of the timing of gain or loss recognition on the hedging instrument with the recognition of the changes in the fair value of the hedged asset or liability that are attributable to the hedged risk in a fair value hedge, or the earnings effect of the hedged forecasted transactions in a cash flow hedge. The Company may enter into derivative contracts that are intended to economically hedge certain of its risk even though hedge accounting does not apply or the Company elects not to apply hedge accounting.

Cash Flow Hedge of Interest Rate Risk

The Amended 2020 Term Loan Facility had an outstanding balance of $393.1 million at December 31, 2020. The 2020 Revolving Credit Facility was undrawn at December 31, 2020. The credit facilities under the 2020 Credit Agreement have variable interest rates based on LIBOR (see Note 14). As a result of exposure to interest rate movements, during March 2020, the Company entered into an interest rate swap arrangement, which effectively converted its $400 million term loan with its variable interest rate based upon one-month LIBOR to an aggregate fixed rate of 0.904%, plus a leverage-based margin as defined in the 2020 Credit Agreement. The Term A Loan continues to have a leverage-based margin and the Term B Loan has a fixed margin as defined in the 2020 Credit Agreement. The notional amount of this swap at December 31, 2020 was $400 million, and the swap matures on March 3, 2025, the same date the Term A Loan matures.

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Notes to Consolidated Financial Statements (Continued)

The Company’s objectives in using interest rate derivatives are to add stability to interest expense and to manage its exposure to interest rate movements. To accomplish this objective, the Company is using an interest rate swap as part of its interest rate risk management strategy. Interest rate swaps designated as cash flow hedges involve the receipt of variable amounts from a counterparty in exchange for the Company making fixed-rate payments over the life of the agreements without exchange of the underlying notional amount.

The effective portion of changes in the fair value of designated derivatives that qualify as cash flow hedges is recorded in accumulated other comprehensive (loss) income in the consolidated balance sheet and is subsequently reclassified into earnings in the period that the hedged forecasted transactions affect earnings. During the year ended December 31, 2020, such a derivative was used to hedge the variable cash flows associated with the credit facilities under the 2020 Credit Agreement, and the Company has accounted for this derivative as an effective hedge. Any ineffective portion of the change in the fair value of the derivative would be recognized directly in earnings.

Amounts reported in accumulated other comprehensive (loss) income related to the Company's derivative will be reclassified to interest expense as interest is accrued on the Company’s variable-rate debt. Based upon projected forward rates, the Company estimates as of December 31, 2020 that $3.2 million may be reclassified as an increase to interest expense over the next twelve months.

The impact of the Company’s derivative financial instrument on its consolidated statement of comprehensive income (loss) for the year ended December 31, 2020 was as follows (in thousands):

Loss recognized in other comprehensive loss on derivative (effective portion)	$	(12,671)
Amount reclassified from accumulated other comprehensive loss to interest expense (effective portion)		1,723
	$	(10,948)

The fair values and locations in the consolidated balance sheet at December 31, 2020 of the Company's derivative liability designated as a hedging instrument were as follows (in thousands):

	Balance sheet location		
Interest rate derivative - liability derivative	Accrued expenses and other	$	3,157
Interest rate derivative - liability derivative	Other long-term liabilities	$	7,791

The Company has classified the interest rate derivative aggregating $10.9 million at December 31, 2020 as a Level 2 fair value measurement within the fair value hierarchy (see Note 6).

(17) REVENUE RECOGNITION

The Company's typical performance obligations include the following:

Performance Obligation	When Performance Obligation is Typically Satisfied	When Payment is Typically Due
Software and Product Revenue		
Software licenses (perpetual or term)	Upon transfer of control; typically, when made available for download (point in time)	Generally, within 30 days of invoicing except for term licenses, which may be paid for over time
Software licenses (subscription)	Upon activation of hosted site (over time)	Generally, within 30 days of invoicing
Hardware	When control of the hardware passes to the customer; typically, upon delivery (point in time)	Generally, within 30 days of invoicing
Software upgrades	Upon transfer of control; typically, when made available for download (point in time)	Generally, within 30 days of invoicing
Customer Support Revenue		
Customer support	Ratably over the course of the support contract (over time)	Generally, within 30 days of invoicing
Professional Services		
Other professional services (excluding training services)	As work is performed (over time)	Generally, within 30 days of invoicing (upon completion of services)
Training	When the class is taught (point in time)	Generally, within 30 days of services being performed

Significant Judgments

The Company's contracts with customers often include promises to transfer multiple products and services to the customer. Determining whether products and services are considered distinct performance obligations that should be accounted for separately versus together may require significant judgment.

Judgment is required to determine the standalone selling price for each distinct performance obligation. The Company typically has more than one standalone selling price ("SSP") for individual products and services due to the stratification of those products and services by customers and circumstances. In these instances, the Company may use information such as the size of the customer and geographic region in determining the SSP.

Deferred Revenue

Deferred revenue is a contract liability representing amounts collected from or invoiced to customers in excess of revenue recognized. This results primarily from the billing of annual customer support agreements where the revenue is recognized over the term of the agreement. The value of deferred revenue will increase or decrease based on the timing of invoices and recognition of revenue.

Disaggregation of Revenue

The Company disaggregates its revenue from contracts with customers based on the nature of the products and services and the geographic regions in which each customer is domiciled. The Company's total revenue for the years ended December 31, 2020, 2019 and 2018 was disaggregated geographically as follows:

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Notes to Consolidated Financial Statements (Continued)

Year ended December 31, 2020	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 201,347	$ 132,661	$ 48,611	$ 382,619
Europe, Middle East and Africa	149,567	73,475	25,226	248,268
Asia Pacific	90,201	36,628	19,627	146,456
Other	26,797	32,052	7,603	66,452
	$ 467,912	$ 274,816	$ 101,067	$ 843,795

Year ended December 31, 2019	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 170,937	$ 133,271	$ 37,085	$ 341,293
Europe, Middle East and Africa	42,262	43,186	12,279	97,727
Asia Pacific	30,617	27,798	10,721	69,136
Other	18,214	29,973	6,768	54,955
	$ 262,030	$ 234,228	$ 66,853	$ 563,111

Year ended December 31, 2018	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 169,510	$ 132,282	$ 35,832	$ 337,624
Europe, Middle East and Africa	37,833	46,856	11,794	96,483
Asia Pacific	53,683	23,555	9,427	86,665
Other	17,988	31,273	7,872	57,133
	$ 279,014	$ 233,966	$ 64,925	$ 577,905

The Company's product revenue from its direct sales program and from indirect sales through its channel partner program for the years ended December 31, 2020, 2019 and 2018 was as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Indirect sales through channel program	$ 134,876	$ 94,639	$ 69,232
Direct sales	333,036	167,391	209,782
	$ 467,912	$ 262,030	$ 279,014

The Company's product revenue from sales to enterprise customers and from sales to service provider customers for the years ended December 31, 2020, 2019 and 2018 was as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Sales to enterprise customers	$ 138,469	$ 70,548	$ 57,534
Sales to service provider customers	329,443	191,482	221,480
	$ 467,912	$ 262,030	$ 279,014

The Company's product revenue and service revenue components by segment for the years ended December 31, 2020, 2019 and 2018 was as follows (in thousands):

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	Year ended December 31,		
	2020	2019	2018
Product revenue			
Cloud and Edge	275,445	262,030	279,014
IP Optical Networks	192,467	—	—
Total product revenue	467,912	262,030	279,014
Service revenue			
Maintenance			
Cloud and Edge	229,035	234,228	233,966
IP Optical Networks	45,781	—	—
Total maintenance revenue	274,816	234,228	233,966
Professional services			
Cloud and Edge	78,790	66,853	64,925
IP Optical Networks	22,277	—	—
Total professional services revenue	101,067	66,853	64,925
Total service revenue	375,883	301,081	298,891

Revenue Contract Balances

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables, which are contract assets, and customer advances and deposits, which are contract liabilities, in the Company's consolidated balance sheets. Amounts are billed as work progresses in accordance with agreed-upon contractual terms, either at periodic intervals or upon achievement of contractual milestones. Completion of services and billing may occur subsequent to revenue recognition, resulting in contract assets. The Company may receive advances or deposits from its customers before revenue is recognized, resulting in contract liabilities which are classified as deferred revenue. These assets and liabilities are reported in the Company's consolidated balance sheets on a contract-by-contract basis as of the end of each reporting period. Changes in the contract asset and liability balances during the years ended December 31, 2020 and 2019 were not materially impacted by any factors other than billing and revenue recognition. Nearly all of the Company's deferred revenue balance is related to services revenue, primarily customer support contracts. Unbilled receivables stem primarily from engagements where services have been performed; however, billing cannot occur until services are completed.

In some arrangements, the Company allows customers to pay for term-based software licenses and products over the term of the software license. The Company also sells SaaS-based software under subscription arrangements, with payment terms over the term of the SaaS agreement. Amounts recognized as revenue in excess of amounts billed are recorded as unbilled receivables. Unbilled receivables that are anticipated to be invoiced in the next twelve months are included in Accounts receivable on the Company's consolidated balance sheets. The changes in the Company's accounts receivable, unbilled receivables and deferred revenue balances for the years ended December 31, 2020 and 2019 were as follows (in thousands):

	Accounts receivable	Unbilled accounts receivable	Deferred revenue (current)	Deferred revenue (long-term)
Balance at January 1, 2020	$ 168,502	$ 24,204	$ 100,406	$ 20,482
Increase (decrease), net	10,829	34,203	(3,582)	5,528
Balance at December 31, 2020	$ 179,331	$ 58,407	$ 96,824	$ 26,010

	Accounts receivable	Unbilled accounts receivable	Deferred revenue (current)	Deferred revenue (long-term)
Balance at January 1, 2019	$ 174,310	$ 13,543	$ 105,087	$ 17,572
Increase (decrease), net	(5,808)	10,661	(4,681)	2,910
Balance at December 31, 2019	$ 168,502	$ 24,204	$ 100,406	$ 20,482

The Company recognized approximately $99 million of revenue in the year ended December 31, 2020 that was recorded as deferred revenue at December 31, 2019 and approximately $94 million of revenue in the year ended December 31, 2019 that

was recorded as deferred revenue at December 31, 2018. Of the Company's deferred revenue reported as long-term in its consolidated balance sheet at December 31, 2020, the Company expects that approximately $15 million will be recognized as revenue in 2022, approximately $6 million will be recognized as revenue in 2023 and approximately $5 million will be recognized as revenue in 2024 and beyond.

All freight-related customer invoicing is recorded as revenue, while the shipping and handling costs that occur after control of the promised goods or services transfer to the customer are reported as fulfillment costs, a component of Cost of revenue - product in the Company's consolidated statements of operations.

Deferred Commissions Cost

Sales commissions earned by the Company's employees are considered incremental and recoverable costs of obtaining a contract with a customer. Under ASC 605, the costs associated with obtaining a customer contract were expensed in the period the revenue was earned. Under ASC 606, these payments have been deferred on our consolidated balance sheet and are being amortized over the expected life of the customer contract, which is five years. At December 31, 2020 and 2019, the Company had $4.1 million and $3.6 million, respectively, of deferred sales commissions capitalized.

(18) OPERATING SEGMENT INFORMATION

The Company has two reportable segments, which are intended to align with the manner in which the business is managed: Cloud and Edge, and IP Optical Networks.

The Cloud and Edge segment provides secure and reliable software and hardware products, solutions and services for enabling Voice over Internet Protocol ("VoIP") communications, Voice over Long-Term Evolution ("VoLTE") and Voice Over 5G ("VoNR") communications and Unified Communications and Collaboration ("UC&C") within service provider and enterprise networks and from the cloud. The Cloud and Edge products are increasingly software-centric and cloud-native for deployment on private, public or hybrid cloud infrastructures, in data centers, on enterprise premises and within service provider networks. Ribbon's Cloud and Edge product portfolio consists of our Session Border Controller ("SBC") products and our Network Transformation ("NTR") products.

The IP Optical Networks segment provides high-performance, secure and reliable hardware and software products solutions for IP networking, switching, routing and optical transport designed to support and enable technologies like 5G, distributed cloud computing and corresponding applications by delivering ultra-low cost-per-bit transport and multi-service flexibility. The IP Optical Networks portfolio offers multiple solutions, including 5G-native solutions for mobile backhaul, metro and edge aggregation, core networking, data center interconnect, legacy NTR and transport solutions for wholesale carriers. This portfolio is offered to service provider, enterprise and industry verticals with critical transport network infrastructures including utilities, government, defense, transportation, and education and research.

The Company has not provided segment asset information as such information is not provided to the CODM and accordingly, asset information is not used in assessing segment performance. Segment revenue and expense included in the tables below represent direct revenue and expense attributable to each segment. Please see Note 10 for information regarding the allocation of goodwill between segments.

The CODM utilizes revenue, adjusted gross margin (revenue divided by gross profit) and adjusted EBITDA (earnings before interest, taxes, depreciation and amortization) to measure and assess each segment's performance. The Company calculates adjusted gross margin by excluding from cost of revenue: stock-based compensation, acquisition-related inventory adjustments and acquisition-related facilities adjustments. The Company calculates adjusted EBITDA by excluding from income (loss) from operations: depreciation; amortization of acquired intangible assets; stock-based compensation; acquisition-related inventory adjustments; acquisition-related facilities adjustments; certain litigation costs; impairment of goodwill; settlement expense;, cancelled debt offering costs; acquisition-, disposal- and integration-related expense; and restructuring and related expense. These adjusted measures may also exclude other items in future periods that the Company believes are not part of the Company's core business. Adjusted gross profit and adjusted EBITDA are not financial measures determined in accordance with U.S. GAAP and may not be comparable to similarly titled measures used by other companies and should not be considered a substitute for income (loss) from operations or gross profit or other results reported in accordance with U.S.

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GAAP. See below for a reconciliation of adjusted gross profit to gross profit and adjusted EBITDA to income (loss) from operations, as those are the most directly comparable U.S. GAAP measures.

Financial information for the IP Optical Networks segment is not presented for any years prior to 2020, as this segment arose from the ECI Acquisition, and accordingly is not included in the Company's consolidated financial statements for the years December 31, 2019 and 2018. The tables below provide net sales, adjusted gross profit, adjusted EBITDA and depreciation expense by reportable segment for the years ended December 31, 2020, 2019 and 2018 (in thousands):

	Year ended December 31,		
	2020	2019	2018
Segment revenue:			
Cloud and Edge	$ 583,270	$ 563,111	$ 577,905
IP Optical Networks	260,525	—	—
Revenue	$ 843,795	$ 563,111	$ 577,905

	Year ended December 31,		
	2020	2019	2018
Segment adjusted gross profit:			
Cloud and Edge	$ 385,137	$ 355,211	$ 348,076
IP Optical Networks	110,845	—	—
Total segment adjusted gross profit	495,982	355,211	348,076
Stock-based compensation expense	(875)	(554)	(459)
Acquisition-related inventory and facilities adjustments	(2,000)	—	(309)
Gross profit	$ 493,107	$ 354,657	$ 347,308

	2020	2019	2018
Segment adjusted EBITDA:			
Cloud and Edge	$ 135,678	$ 85,701	$ 51,934
IP Optical Networks	(4,512)	—	—
Total segment adjusted EBITDA	131,166	85,701	51,934
Depreciation	(17,188)	(11,949)	(11,200)
Amortization of intangible assets	(60,910)	(49,225)	(49,723)
Stock-based compensation	(13,899)	(12,601)	(11,072)
Acquisition-related inventory and facilities adjustments	(2,000)	—	(966)
Litigation costs	(2,101)	(7,734)	(7,682)
Impairment of goodwill	—	(164,300)	—
Settlement expense	—	—	(1,730)
Cancelled debt offering costs	—	—	(1,003)
Acquisition-, disposal- and integration-related expense	(17,164)	(12,953)	(16,951)
Restructuring and related expense	(16,235)	(16,399)	(17,015)
Income (loss) from operations	$ 1,669	$ (189,460)	$ (65,408)
Depreciation expense:			
Cloud and Edge	$ 12,111	$ 11,949	$ 11,200
IP Optical Networks	5,077	—	—
Depreciation expense	$ 17,188	$ 11,949	$ 11,200

(19) MAJOR CUSTOMERS

The following customers contributed 10% or more of the Company's revenue in at least one of the years ended December

31, 2020, 2019 and 2018:

	Year ended December 31,		
	2020	2019	2018
Verizon Communications Inc.	15%	17%	17%
AT&T Inc.	*	12%	*

* Less than 10% of total revenue.

At December 31, 2020, one customer accounted for 10% or more of the Company's accounts receivable balance, representing approximately 12% in the aggregate of total accounts receivable. At December 31, 2019, one customer accounted for 10% or more of the Company's accounts receivable balance, representing approximately 32% of total accounts receivable. The Company performs ongoing credit evaluations of its customers and generally does not require collateral on accounts receivable. The Company maintains an allowance for doubtful accounts and such losses have been within management's expectations.

(20) COMMON STOCK REPURCHASES

In the second quarter of 2019, the Company's Board of Directors (the "Board") approved a stock repurchase program (the "Repurchase Program") pursuant to which the Company may repurchase up to $75 million of its common stock prior to April 18, 2021. Repurchases under the Repurchase Program may be made in the open market, in privately negotiated transactions or otherwise, with the amount and timing of repurchases depending on market conditions and corporate discretion. The Repurchase Program does not obligate the Company to acquire any particular amount of common stock and may be extended, modified, suspended or discontinued at any time at the Board's discretion. The stock repurchases are being funded using the Company's working capital. During the year ended December 31, 2019, the Company spent $4.5 million, including transaction fees, to repurchase and retire 1.0 million shares of its common stock under the Repurchase Program. The Company did not repurchase any common stock during the year ended December 31, 2020. At December 31, 2020, the Company had $70.5 million remaining under the Repurchase Program for future repurchases.

(21) STOCK-BASED COMPENSATION PLANS

2019 Stock Incentive Plan

At the Company's annual meeting of stockholders held on June 5, 2019, the Company's stockholders approved the Ribbon Communications Inc. Incentive Award Plan (the "2019 Plan"). The 2019 Plan had previously been approved by the Board, subject to stockholder approval. At the Company's annual meeting of stockholders held on June 2, 2020, the Company's stockholders approved an amendment to the 2019 Plan to increase the number of shares of the Company's common stock authorized for issuance under the 2019 Plan by 7.5 million shares.

Under the 2019 Plan, the Company may grant awards aggregating up to 14.5 million shares of common stock (subject to adjustment in the event of stock splits and other similar events), plus 5.1 million shares of common stock that remained available for issuance under the Company's Amended and Restated Stock Incentive Plan (the "2007 Plan") on June 5, 2019, plus any shares covered by awards under the 2007 Plan (or the Company's other prior equity compensation plans) that again become available for grant pursuant to the provisions of the 2007 Plan. The 2019 Plan provides for the grant of options to purchase the Company's common stock ("stock options"), stock appreciation rights ("SARs"), restricted stock awards ("RSAs"), performance-based stock awards ("PSAs"), restricted stock units ("RSUs"), performance-based stock units ("PSUs") and other stock- or cash-based awards. Awards can be granted under the 2019 Plan to the Company's employees, officers and non-employee directors, as well as consultants and advisors of the Company and its subsidiaries. At December 31, 2020, there were 8.9 million shares available for future issuance under the 2019 Plan.

2007 Plan

The Company's 2007 Plan provided for the award of stock options, SARs, RSAs, RSUs, PSAs, PSUs and other stock-based awards to employees, officers, non-employee directors, consultants and advisors of the Company and its subsidiaries. On and

following June 5, 2019, with the exception of shares underlying awards outstanding as of that date, no additional shares may be granted under the 2007 Plan.

2002 Stock Option Plan

In connection with the Edgewater Acquisition, the Company assumed Edgewater's Amended and Restated 2002 Stock Option Plan, converted all then-outstanding options to purchase Edgewater common stock (the "Assumed Options") to Ribbon stock options (the "Ribbon Replacement Options"), and subsequently renamed it the 2002 Stock Option Plan (the "2002 Plan"). The Ribbon Replacement Options are vesting under the same schedules as the respective Edgewater Options. The fair values of the Assumed Options were estimated using a Black-Scholes option pricing model. The Company recorded $0.7 million as additional purchase consideration for the fair value of the Assumed Options. The fair value of the Ribbon Replacement Options attributable to future service totaled $1.0 million, which will be fully expensed by the end of 2021.

2012 Stock Incentive Plan

In connection with the acquisition of Performance Technologies, Inc. ("PT"), the Company assumed PT's 2012 Amended Performance Technologies, Incorporated Omnibus Incentive Plan, and subsequently renamed it the 2012 Stock Incentive Plan (the "2012 Plan"). In December 2014, all of the unissued shares under the 2012 Plan were transferred to the 2007 Plan. Any outstanding awards under the 2012 Plan that in the future expire, terminate, are canceled, surrendered or forfeited, or are repurchased by the Company will be returned to the 2019 Plan. Accordingly, at December 31, 2020 there were no shares available for future issuance under the 2012 Plan.

2008 Stock Incentive Plan

In connection with the acquisition of Network Equipment Technologies, Inc. ("NET"), the Company assumed NET's 2008 Equity Incentive Plan and subsequently renamed it the 2008 Stock Incentive Plan (the "2008 Plan"). In December 2014, all of the unissued shares under the 2008 Plan were transferred to the 2007 Plan. Any outstanding awards under the 2008 Plan that in the future expire, terminate, are canceled, surrendered or forfeited, or are repurchased by the Company will be returned to the 2019 Plan. Accordingly, at December 31, 2020 there were no shares available for future issuance under the 2008 Plan.

Executive Equity Arrangements

Inducement Awards

In connection with his appointment as President and Chief Executive Officer of Ribbon, and as an inducement for Bruce McClelland's ("Mr. McClelland") commencement of employment, the Company awarded Mr. McClelland sign-on equity grants, comprised of an RSU grant and a PSU grant with both market service conditions (the "Inducement PSUs") on March 16, 2020. Subject to Mr. McClelland's continued employment, 462,963 RSUs are eligible to vest on the earlier of March 16, 2021 or the date of the consummation of a change in control of the Company and, upon vesting, will be settled in shares of Ribbon's common stock. The RSUs had a grant date fair value of $1.0 million on the date of grant. Subject to Mr. McClelland's continued employment, the PSUs are eligible to vest and be settled in up to 4,750,000 shares of Ribbon common stock upon the achievement of specified share price thresholds on or prior to September 1, 2024. These grants are reported in the applicable tables below.

Performance-Based Stock Grants

In addition to granting RSAs and RSUs and the aforementioned Inducement PSUs, to its executives and certain of its employees, the Company also grants PSUs to certain of its executives.

PSU Grants - 2020 and 2019. In both 2020 and 2019, the Company granted certain of its executives (the "2020 PSUs" and "2019 PSUs", respectively), of which 60% of each executive's PSU grant had both performance service conditions (the "Performance PSUs") and 40% had both market and service conditions (the "Market PSUs").

Each executive's Performance PSU grant is comprised of three consecutive fiscal year performance periods beginning in the year of grant (each, a "Fiscal Year Performance Period"), with one-third of the Performance PSUs attributable to each Fiscal

Year Performance Period. The number of shares that will be vest for each Fiscal Year Performance Period, if any, will be based on the achievement of certain metrics related to the Company's financial performance for the applicable year on a standalone basis (each, a "Fiscal Year Performance Condition"). The Company's achievement of the goals for each Fiscal Year Performance Condition (and the number of shares of Company common stock to vest as a result thereof) are being measured on a linear sliding scale in relation to specific threshold, target and stretch performance conditions, with any shares earned vesting in the first quarter of the fiscal year following the third Performance Period of the grant, pending each executive's continued employment with the Company through that date. The number of shares of common stock underlying the Performance PSUs that can be earned will in no event exceed 200% of the Performance PSUs. Shares subject to the Performance PSUs that fail to be earned will be forfeited.

The Market PSUs have one three-year performance period, beginning January 1 in the year of grant and ending on December 31, three years thereafter (the "Market Performance Period"). The number of shares subject to the Market PSUs that will vest, if any, will be dependent upon the Company's total shareholder return ("TSR") compared with the TSR of the companies included in the Nasdaq Telecommunications Index for the applicable Market Performance Period, measured by the Compensation Committee after the Market Performance Period ends, with any shares earned vesting in the first quarter of the fiscal year following the respective Market Performance Period, pending each executive's continued employment with the Company through that date. The number of shares of common stock underlying the Market PSUs that can be earned will in no event exceed 200% of the Market PSUs. Shares subject to the Market PSUs that fail to be earned will be forfeited.

In addition, in connection with his appointment as Executive Vice President and General Manager, Packet Optical Networking, the Company granted Sam Bucci 133,333 PSUs (the "Bucci Stock Price PSUs") with both market and service conditions. Subject to Mr. Bucci's continued employment, the Bucci Stock Price PSUs were eligible to vest and be settled in shares of Ribbon common stock upon the achievement of a specific share price threshold on or prior to January 31, 2022. The price share threshold was met on February 12, 2021 and the shares vested and were released on February 15, 2021.

2020 PSUs. From June through September 2020, the Company granted certain of its executives an aggregate of 823,369 PSUs, of which 494,020 PSUs had both performance and service conditions (the “2020 Performance PSUs”) and 329,349 had both market and service conditions (the “2020 Market PSUs”). The three Fiscal Year Performance Periods for the 2020 Performance PSUs are the years ended December 31, 2020, 2021 and 2022 (respectively, the “2020 Performance Period”, “2021 Performance Period” and “2022 Performance Period”). As of December 31, 2020, the Company determined that the grant date criteria for the 2021 Performance Period and the 2022 Performance Period had not been met, as the goals for these performance periods had not been established by the Company, and accordingly, no expense has been recorded related to these performance periods.

2019 PSUs. In March and April 2019, the Company granted certain of its executives an aggregate of 872,073 PSUs, of which 523,244 PSUs had both performance and service conditions (the "Performance PSUs") and 348,829 PSUs had both market and service conditions (the "Market PSUs"). The three Fiscal Year Performance Periods for the 2019 Performance PSUs are the years ended December 31, 2019, 2020 and 2021 (respectively, the “2019 Performance Period”, “2020 Performance Period” and “2021 Performance Period”). In the third quarter of 2019, the Company adjusted the goals for the 2019 Performance Period to reflect the changes to the Company's calculation of certain metrics. There was no incremental expense in connection with this modification. In March 2020, the Compensation Committee determined that the performance conditions for the 2019 Performance Period had been satisfied at the 30.493% level. As of December 31, 2020, the Company determined that the grant date criteria for the 2021 Fiscal Year Performance Period had not been met, as the goals for the 2021 Performance Period had not been established by the Company, and accordingly, no expense has been recorded related to this performance period.

PSU Grants - 2018. In May 2018, the Company granted its then-current President and Chief Executive Officer ("Mr. Hobbs") 195,000 PSUs with both performance and service conditions (the “2018 PSUs”). Of the 195,000 2018 PSUs, one-half each would vest based on the achievement of two separate metrics related to the Company’s 2018 financial performance (the “2018 Performance Conditions”). The Company’s achievement of the 2018 Performance Conditions (and the shares of Company common stock to vest as a result thereof) were measured on a linear sliding scale in relation to specific threshold, target and stretch performance conditions. The number of shares of common stock to be received upon vesting of the 2018 PSUs would in no event exceed 150% of the 2018 PSUs. The Compensation Committee ultimately determined that the performance conditions for the 2018 PSUs had been achieved at the 150% level, for a total of 292,500 shares eligible to be issued (the "2018 Shares Earned"), pending Mr. Hobbs' continued employment with the Company through December 31, 2020.

In connection with his separation from the Company effective December 31, 2019, the vesting schedule for the 2018 Shares Earned was accelerated and the shares were released on January 30, 2020. The release of these shares is included in the PSU table below.

Accounting for Performance PSUs. Once the grant date criteria have been met for a Fiscal Year Performance Period, the Company records stock-based compensation expense for the respective shares underlying the PSUs based on its assessment of the probability that the respective performance condition will be achieved and the level, if any, of such achievement. The Compensation Committee determines the number of shares earned, if any, after the Company's financial results for each Fiscal Year Performance Period are finalized. Upon the determination by the Compensation Committee of the number of shares that will be received upon vesting of the related Performance PSUs, such number of shares becomes fixed and the unamortized expense is recorded through the remainder of the service period, at which time such Performance PSUs earned, if any, will vest, pending each executive's continued employment with the Company through that date.

Accounting for Market PSUs. PSUs that include a market condition require the use of a Monte Carlo simulation approach to model future stock price movements based upon the risk-free rate of return, the volatility of each entity and the pair-wise covariance between each entity. These results are then used to calculate the grant date fair values of the respective PSUs. The Company is required to record expense for the PSUs with market conditions through their respective final vesting dates regardless of the number of shares that are ultimately earned.

Stock-for-Cash Bonus Election

In connection with the Company’s annual incentive program, certain executives of the Company were given the choice to receive a portion of their fiscal year 2018 bonuses (the “2018 Bonus”), if any were earned, in the form of shares of the Company’s common stock (the “2018 Bonus Shares”). Each executive could also elect not to participate in this program and to earn his or her 2018 Bonus, if any, in the form of cash. The Company determined that the grant date criteria for the 2018 Bonus Shares had not been met as of December 31, 2018, as the number of shares to be granted to each executive had not been determined. The Company recorded stock-based compensation expense totaling $1.1 million in connection with the Stock Bonus Program in 2018 and recorded a liability in connection with the future issuance of the 2018 Bonus Shares. This liability was reclassified to equity at the time the shares were granted on March 15, 2019.

Accelerated Vesting of Stock Units

In connection with the separation of several executives from the Company in the years ended December 31, 2020 and 2019, the Company accelerated the vesting of certain of their outstanding RSUs and PSUs in accordance with their respective terms of employment with the Company, with the potential for a portion of certain other PSUs aggregating approximately 43,000 shares to be released to two of these former executives on a pro rata basis subject to achievement of the related performance or market conditions for the performance periods through their respective 2020 separation dates.

Stock Options

The Company has not granted stock options since 2017. Outstanding stock options granted under the Company's plans expire either seven or ten years from the date of grant. The grant date fair value of stock options, adjusted for estimated forfeitures, is recognized as expense on a straight-line basis over the requisite service period, which is generally the vesting period. Forfeitures are estimated based on historical experience.

The activity related to the Company's outstanding stock options during the year ended December 31, 2020 was as follows:

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value (in thousands)
Outstanding at January 1, 2020	297,124	$ 11.55		
Granted	—	$ —		
Exercised	(38,288)	$ 1.81		
Forfeited	(6,055)	$ 2.78		
Expired	(45,071)	$ 15.72		
Outstanding at December 31, 2020	207,710	$ 12.69	3.73	$ 262
Vested or expected to vest at December 31, 2020	207,518	$ 12.70	3.73	$ 261
Exercisable at December 31, 2020	201,138	$ 12.93	3.67	$ 241

The total intrinsic values of options exercised were $0.1 million for the year ended December 31, 2020, $0.5 million for the year ended December 31, 2019 and approximately $39,000 for the year ended December 31, 2018.

The Company received cash from option exercises of $0.1 million in the year ended December 31, 2020, $0.2 million in the year ended December 31, 2019 and $0.1 million in the year ended December 31, 2018.

Restricted Stock Grants - Restricted Stock Awards and Restricted Stock Units

The Company's outstanding restricted stock grants consist of both RSAs and RSUs. Holders of unvested RSAs have voting rights and rights to receive dividends, if declared; however, these rights are forfeited if the underlying unvested RSA shares are forfeited. Holders of unvested RSUs do not have such voting and dividend rights. The grant date fair value of restricted stock grants, adjusted for estimated forfeitures, is recognized as expense on a straight-line basis over the requisite service period. The fair value of restricted stock grants is determined based on the market value of the Company's shares on the date of grant.

The activity related to the Company's RSAs for the year ended December 31, 2020 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2020	487,976	$ 6.87
Granted	—	$ —
Vested	(360,204)	$ 6.82
Forfeited	(40,789)	$ 6.96
Unvested balance at December 31, 2020	86,983	$ 7.04

The activity related to the Company's RSUs for the year ended December 31, 2020 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2020	2,790,060	$ 5.11
Granted	6,550,106	$ 2.96
Vested	(1,886,486)	$ 4.65
Forfeited	(922,570)	$ 3.50
Unvested balance at December 31, 2020	6,531,110	$ 3.32

The total grant date fair value of vested restricted stock grant shares was $11.2 million in the year ended December 31, 2020, $9.9 million in the year ended December 31, 2019 and $9.7 million in the year ended December 31, 2018.

Performance-Based Stock Units

Holders of unvested PSUs do not have voting and dividend rights. The Company recognizes stock-based compensation expense for PSUs without market conditions on a straight-line basis, with the amount recorded based upon the expected level of achievement as of each period-end, recording cumulative adjustments in the period when the expected level of achievement changes. The Company recognizes the grant date fair value of PSUs on a graded attribution basis through the vest date of the respective awards so long as it remains probable that the related service conditions will be satisfied.

The activity related to the Company's PSUs for the year ended December 31, 2020 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2020	1,067,073	$ 5.94
Granted	5,804,202	$ 1.41
Vested	(323,752)	$ 5.52
Forfeited	(511,592)	$ 5.37
Unvested balance at December 31, 2020	6,035,931	$ 1.56

The total grant date fair value of vested performance-based stock grant shares was $1.8 million in the year ended December 31, 2020, $0.1 million in the year ended December 31, 2019 and $0.6 million in the year ended December 31, 2018.

ESPP

The ESPP was designed to provide eligible employees of the Company and its participating subsidiaries an opportunity to purchase common stock of the Company through accumulated payroll deductions. The last purchase under the ESPP was on November 29, 2019, and the ESPP expired on May 20, 2020.

Stock-Based Compensation

The consolidated statements of operations included stock-based compensation for the years ended December 31, 2020, 2019 and 2018 as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Product cost of revenue	$ 174	$ 76	$ 114
Service cost of revenue	701	478	345
Research and development	2,968	1,898	1,797
Sales and marketing	4,129	3,028	2,935
General and administrative	5,927	7,121	5,881
	$ 13,899	$ 12,601	$ 11,072

There was an income tax benefit for employee stock-based compensation expense for the year ended December 31, 2020, but no income tax benefit for the years ended December 31, 2019 and 2018 due to the valuation allowance recorded.

In the year ended December 31, 2019, the Company recorded nominal incremental expense related to the accelerated vesting of RSUs and PSUs held by certain former executives of the Company in connection with their separations from the Company. Stock-based compensation expense recorded for the year ended December 31, 2019 included $1.6 million of incremental expense related to the accelerated vesting of RSUs and PSUs held by the former President and Chief Executive Officer in connection with his separation from the Company.

At December 31, 2020, there was $19.3 million, net of expected forfeitures, of unrecognized stock-based compensation expense related to unvested stock options, RSAs, RSUs and PSUs. This expense is expected to be recognized over a weighted average period of approximately two years.

Common Stock Reserved

At December 31, 2020, there were 8,888,677 shares of common stock reserved for future issuance under the 2019 Plan. The Company's policy is to issue authorized but unissued shares upon the exercise of stock options, to grant restricted common stock, to settle restricted stock units and performance-based stock units, and to authorize the purchase of shares of the Company's common stock under the ESPP.

(22) LEASES

The Company has operating and finance leases for corporate offices, research and development facilities, and certain equipment. Operating leases are reported separately in the Company's consolidated balance sheet at December 31, 2020 and 2019. Assets acquired under finance leases are included in Property and equipment, net, in the consolidated balance sheets at December 31, 2020 and 2019.

The Company determines if an arrangement is a lease at inception. A contract is determined to contain a lease component if the arrangement provides the Company with a right to control the use of an identified asset. Lease agreements may include lease and non-lease components. In such instances for all classes of underlying assets, the Company does not separate lease and non-lease components but rather, accounts for the entire arrangement under leasing guidance. Leases with an initial term of 12 months or less are not recorded on the balance sheet and lease expense for these leases is recognized on a straight-line basis over the lease term.

Right-of-use assets and lease liabilities are initially measured based on the present value of the future minimum fixed lease payments (i.e., fixed payments in the lease contract) over the lease term at the commencement date. As the Company's existing leases do not have a readily determinable implicit rate, the Company uses its incremental borrowing rate based on the information available at the commencement date in determining the present value of future minimum fixed lease payments. The Company calculates its incremental borrowing rate to reflect the interest rate that it would have to pay to borrow on a collateralized basis an amount equal to the lease payments in a similar economic environment over a similar term and considers its historical borrowing activities and market data from entities with comparable credit ratings in this determination. The measurement of the right-of-use asset also includes any lease payments made prior to the commencement date (excluding any lease incentives) and initial direct costs incurred. The Company assessed its right-of-use assets for impairment as of December 31, 2020 and 2019 and determined no impairment had occurred.

Lease terms may include options to extend or terminate the lease and the Company incorporates such options in the lease term when it has the unilateral right to make such an election and it is reasonably certain that the Company will exercise that option. In making this determination, the Company considers its prior renewal and termination history and planned usage of the assets under lease, incorporating expected market conditions.

For operating leases, lease expense for minimum fixed lease payments is recognized on a straight-line basis over the lease term. The expense for finance leases includes both interest and amortization expense components, with the interest component calculated based on the effective interest method and the amortization component calculated based on straight-line amortization of the right-of-use asset over the lease term. Lease contracts may contain variable lease costs, such as common area maintenance, utilities and tax reimbursements that vary over the term of the contract. Variable lease costs are not included in minimum fixed lease payments and as a result, are excluded from the measurement of the right-of-use assets and lease liabilities. The Company expenses all variable lease costs as incurred.

In connection with the 2019 Restructuring Initiative, certain lease assets related to facilities are being partially or fully vacated as the Company consolidates its facilities. The Company has no plans to enter into sublease agreements for certain facilities. The Company ceased use of these facilities in the first and fourth quarters of 2020 and in the third quarter of 2019. Accordingly, the Company accelerated the amortization of the associated lease assets through the planned cease-use date of each facility, resulting in additional amortization expense of $0.6 million and $3.7 million in the years ended December 31, 2020 and 2019, respectively. The Company also recorded a liability aggregating $0.9 million in 2019 for all future estimated variable lease costs related to these facilities. This incremental accelerated amortization and accrual for all estimated future variable lease costs are included in Restructuring and related expense in the Company's consolidated statements of operations for the years ended December 31, 2020 and 2019. The Company may incur additional future expense if it is unable to sublease

other locations included in the Facilities Initiative.

The Company leases its corporate offices and other facilities under operating leases, which expire at various times through 2032. The Company's corporate headquarters is located in a leased facility in Westford, Massachusetts under a lease that expires in August 2028. The Company's finance leases primarily consist of equipment.

In December 2020, the Company began relocating from its leased Plano, Texas facility to the recently constructed building space in North Dallas, Texas as part of its 2019 Restructuring and Facilities Consolidation Initiative. The Company's relocation from its leased Plano, Texas facility is expected to be completed in the first quarter of 2021.

The Company's right-of-use lease assets and lease liabilities at December 31, 2020 and December 31, 2019 were as follows (in thousands):

	Classification	December 31, 2020	December 31, 2019
Assets			
Operating lease assets	Operating lease right-of-use assets	$ 69,757	$ 36,654
Finance lease assets*	Property and equipment, net	983	2,420
Total leased assets		$ 70,740	$ 39,074
Liabilities			
Current			
Operating	Operating lease liabilities	$ 17,023	$ 7,719
Finance	Accrued expenses and other	902	1,005
Noncurrent			
Operating	Operating lease liabilities, net of current	72,614	37,202
Finance	Other long-term liabilities	568	2,144
Total lease liabilities		$ 91,107	$ 48,070

* Finance lease assets were recorded net of accumulated depreciation of $1.9 million and $2.0 million at December 31, 2020 and December 31, 2019, respectively.

The components of lease expense for the year ended December 31, 2020 and 2019 were as follows (in thousands):

	Year ended December 31, 2020	Year ended December 31, 2019
Operating lease cost*	$ 19,582	$ 13,865
Finance lease cost		
Amortization of leased assets	1,200	1,106
Interest on lease liabilities	173	265
Short-term lease cost	20,687	19,460
Variable lease costs (costs excluded from minimum fixed lease payments)**	2,713	3,264
Sublease income	(1,087)	(374)
Net lease cost	$ 43,268	$ 37,586

* Operating lease cost for the years ended December 31, 2020 and 2019 include $0.6 million and $3.7 million, respectively, of accelerated amortization for certain assets partially or fully vacated with no intent or ability to sublease.
** Variable lease costs for the year ended December 31, 2019 included an accrual of $0.9 million for all future estimated variable expenses related to certain assets partially or fully vacated with no intent or ability to sublease. No such variable costs were accrued in the year ended December 31, 2020.

The Company elected to use the alternative transition method upon adoption of ASC 842 on January 1, 2019. This method allowed entities to initially apply the standard at the adoption date with no subsequent adjustments to prior period lease costs for

comparability. As a result, operating leases in periods prior to the Company's adoption of ASC 842 were not recorded on the consolidated balance sheet. Prior to the adoption of ASC 842, rent expense (including any escalation clauses, free rent and other lease concessions) on operating leases was recognized on a straight-line basis over the minimum lease term, and this remains consistent with the Company's application of ASC 842. Rent expense was $11.9 million, interest expense for finance leases was approximately $52,000, and amortization expense for finance leases was $0.6 million for the year ended December 31, 2018.

Cash flow information related to the Company's leases for the years ended December 31, 2020 and 2019 was as follows (in thousands):

	Year ended December 31,	
	2020	2019
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	$ 19,161	$ 10,559
Operating cash flows from finance leases	$ 173	$ 265
Financing cash flows from finance leases	$ 1,279	$ 913

Other information related to the Company's leases as of December 31, 2020 and 2019 was as follows (in thousands):

	December 31,	
	2020	2019
Weighted average remaining lease term (years):		
Operating leases	6.59	6.73
Finance leases	1.70	2.35
Weighted average discount rate:		
Operating leases	5.67 %	6.50 %
Finance leases	6.15 %	7.54 %

Future minimum fixed lease payments under noncancelable leases at December 31, 2020 were as follows (in thousands):

	December 31, 2020	
	Operating leases	Finance leases
2021	$ 21,366	$ 981
2022	20,171	506
2023	17,312	62
2024	10,420	—
2025	8,544	—
2026 and beyond	32,516	—
Total lease payments	110,329	1,549
Less: interest	(20,692)	(80)
Present value of lease liabilities	$ 89,637	$ 1,469

(23) EMPLOYEE DEFINED CONTRIBUTION PLANS

The Company offers 401(k) savings plans to eligible employees. The Company matches 50% of each employee's contributions to the 401(k) program up to 4% of the employee's eligible earnings, for a maximum match of 2% of eligible earnings.

The Company recorded expense related to its employee defined contribution plans aggregating $3.4 million in the year ended December 31, 2020, $4.0 million in the year ended December 31, 2019 and $3.2 million in the year ended December 31, 2018.

(24) NON-U.S. EMPLOYEE DEFINED BENEFIT PLANS

The Company has defined benefit retirement plans that cover certain employees at various international locations. The Company's policy is to contribute amounts at least sufficient to satisfy the minimum amount required by applicable law and regulations or to directly pay benefits where appropriate. Benefits under the defined benefit plans are typically based either on years of service and the employee's compensation (generally during a fixed number of years immediately before retirement) or on annual credits. The range of assumptions that are used for these non-U.S. defined benefit plans reflect the different economic environments within the various countries.

In the year ended December 31, 2020, the Company assumed ECI's defined benefit plans in connection with the ECI Acquisition. These plans exist in several international locations where severance pay is either required by law for voluntary terminations or upon reaching a statutory retirement age. The Company adopted ECI's policy to fund notional accounts each month in the name of each employee to satisfy not only the severance amounts required by the applicable laws and regulations in certain countries, but also to satisfy severance for other types of terminations not necessarily required by law, but paid in accordance with company policy. Benefits funded and paid under these plans are based upon years of service and the employees' current compensation. At the ECI Acquisition Date, ECI accounted for these plans under the shutdown approach allowed under ASC 715, *Compensation - Retirement Benefits (Topic 715)* ("ASC 715"). Beginning December 31, 2020, in order to be consistent with the accounting methodology utilized for Ribbon's other defined benefit plans, the Company began to account for the ECI assumed plans using the actuarial cost approach, which is also allowed under ASC 715 for these types of plans. The range of assumptions that are utilized for these plans reflects the different economic environments within each country where such severance indemnities are required.

In 2020, regulatory changes occurred in the Netherlands that changed the Company's defined benefit pension plan there from a participating plan to a non-participating plan. This plan amendment triggered settlement accounting, resulting in a gain of $1.6 million, which is included in Other income (expense), net, in the Company's consolidated statement of operations for the year ended December 31, 2020. Prior to the amendment, the Company's Netherlands pension plan provided defined benefit accruals which were financed by insurance contracts that had a profit sharing feature. The pension benefits accrued were subject to future increases based on final earnings at the end of employment (the final average earnings formula). With the amendment in 2020, the final average earnings formula was frozen and the insurance contracts were converted to fully paid contracts. Following the amendment, pension accruals are now based upon a new formula that only considers current earnings (the career earnings formula) with the benefits still financed through insurance contracts. Ribbon has no further liability for pension benefits earned prior to the amendment as they are fully paid contracts. In addition, the insurance contract for the new benefit accruals has no profit sharing feature. Therefore, Ribbon has no current or future obligation to pay pension benefits promised in the Netherlands beyond the payment of premiums to the insurance company.

During the year ended December 31, 2019, in conjunction with the 2019 Restructuring Initiative, there were reductions in force that significantly reduced benefits that can be earned under the plan in one of our international locations that resulted in an immaterial curtailment loss. Settlement accounting was triggered in the year ended December 31, 2019 related to a reduction in force in one of our locations in 2018, resulting in an immaterial settlement gain.

During the year ended December 31, 2018, in conjunction connection with the Merger Restructuring Initiative, there were reductions in force that significantly reduced benefits that can be earned under the defined benefit plans in several international locations that resulted in curtailment accounting. A curtailment gain of $0.5 million was recognized in 2018 and included as a component of Other income (expense), net, in the Company's consolidated statement of operations. In the year ended December 31, 2018, settlement accounting was triggered in only one of these locations, resulting in an immaterial settlement charge.

A reconciliation of the changes in the benefit obligations and fair value of the assets of the defined benefit plans for the years ended December 31, 2020 and 2019, the funded status of the plans, and the amounts recognized in the consolidated balance sheets as of December 31, 2020 and 2019 were as follows (in thousands):

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Notes to Consolidated Financial Statements (Continued)

	Year ended December 31,	
	2020	2019
Changes in projected benefit obligations:		
Projected benefit obligation, beginning of year	$ 11,784	$ 10,848
Business combination	17,963	—
Service cost	1,459	335
Interest cost	46	140
Participant contributions	—	24
Plan amendments	(4,440)	—
Benefits and expenses paid	(1,976)	(44)
Net actuarial loss on obligation	231	1,059
Curtailment	—	82
Settlement	—	(660)
Projected benefit obligation, end of year	$ 25,067	$ 11,784
Changes in plan assets:		
Fair value of plan assets, beginning of year	$ 1,830	$ 3,842
Business combination	13,188	—
Actual return on plan assets	1,077	(1,471)
Plan amendments	(588)	—
Employer contributions	798	139
Participant contributions	21	24
Administrative expenses	—	(21)
Benefits paid	(1,976)	(683)
Fair value of plan assets, end of year	$ 14,350	$ 1,830
Funded status at end of year	$ (10,717)	$ (9,954)
Amounts recognized in accumulated other comprehensive loss consist of:		
Net actuarial loss	$ (102)	$ 2,743
Amounts recognized in the consolidated balance sheets consist of:		
Accrued expenses and other (current pension liability)	$ (435)	$ (74)
Other long-term liabilities (non-current pension liability)	(10,282)	(9,880)
Net amount recognized	$ (10,717)	$ (9,954)

The increase in the underfunded status of the Company's defined benefit plans at December 31, 2020 compared to December 31, 2019 was the result of the assumption of the ECI plans in connection with the ECI Acquisition, and a general decrease in discount rates which resulted in increases in projected benefit obligations, partially offset by the effect of the change in the benefit structure of the Netherlands plan from the plan amendment that occurred in 2020 as a result of regulatory changes.

Plans with underfunded or non-funded accumulated benefit obligations at December 31, 2020 and 2019 were as follows (in thousands):

	December 31,	
	2020	2019
Aggregate projected benefit obligation	$ 25,067	$ 11,784
Aggregate accumulated benefit obligation	$ 20,746	$ 7,759
Aggregate fair value of plan assets	$ 14,350	$ 1,830

Net periodic benefit costs for the years ended December 31, 2020, 2019 and 2018 were as follows (in thousands):

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Notes to Consolidated Financial Statements (Continued)

	Year ended December 31,		
	2020	2019	2018
Service cost	$ 1,459	$ 335	$ 449
Interest cost	46	140	150
Expected return on plan assets	(343)	(14)	(45)
Plan asset expenses	20	21	22
Curtailment charge (credit)	—	13	(510)
Settlement (credit) charge	(1,557)	115	3
Net periodic benefit costs	$ (375)	$ 610	$ 69

The Company made benefit payments of $2.0 million, $0.7 million and $0.3 million in the years ended December 31, 2020, 2019 and 2018, respectively. These benefit payments included $0.7 million and $0.3 million of one-time lump sum payments to participants in the years ended December 31, 2019 and 2018, respectively. No one-time lump sum payments were made to participants in the year ended December 31, 2020. Expected benefit payments for the next ten years are as follows (in thousands):

Years ending December 31,	
2021	$ 1,508
2022	1,759
2023	1,471
2024	1,298
2025	989
2026 to 2030	8,674
	$ 15,699

The changes in plan assets and benefit obligations recognized in other comprehensive income (loss) before tax for the years ended December 31, 2020, 2019 and 2018 were as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Net (gain) loss	$ (558)	$ 2,526	$ (356)
Settlement gain	(1,557)	—	—
Total recognized in comprehensive income (loss)	$ (2,115)	$ 2,526	$ (356)

The Company defers all actuarial gains and losses resulting from variances between actual results and economic estimates or actuarial assumptions. The unrecognized actuarial gains and losses are recorded as unrealized pension actuarial gains (losses) in the Company's consolidated balance sheets as a component of Accumulated other comprehensive income. These unrecognized gains and losses are amortized as a component of net periodic benefit cost when the net gains and losses exceed 10% of the greater of the market value of plan assets or the projected benefit obligation at the beginning of the year. Amortization of the amount included in Accumulated other comprehensive income into net periodic benefit cost is expected to total $0.1 million for the year ended December 31, 2021.

The principal weighted average assumptions used to determine the benefit obligation at December 31, 2020 and 2019 were as follows:

	December 31,	
	2020	2019
Discount rate	2.16 %	0.68 %
Rate of compensation increase	2.41 %	2.88 %

The principal weighted average assumptions used to determine net period benefit cost for the years ended December 31, 2020, 2019 and 2018 were as follows:

	Year ended December 31,		
	2020	2019	2018
Discount rate	0.68 %	1.30 %	1.50 %
Expected long-term return on plan assets	0.21 %	1.12 %	1.34 %
Rate of compensation increase	2.88 %	2.83 %	3.38 %

Assumed discount rates are used in the measurement of the projected and accumulated benefit obligations, as well as the service and interest cost components of net periodic pension cost. Estimated discount rates reflect the rates at which the pension benefits could be effectively settled. For each defined benefit plan, the Company chooses an estimated discount rate from a readily available market index rate, based upon high-quality fixed income investments, specific to the country or economic zone in which the benefits are paid and taking into account the duration of the plan and the number of participants.

The Company's plans in both the Netherlands and Switzerland are funded through insurance contracts, which have historically provided guaranteed interest credit. The fair value of these contracts is derived from the insurance companies' assessment of the minimum value of the benefits provided by the insurance contracts. The methodology used to value these plan assets has always assumed that the value of the plan assets equals the guaranteed insured benefits. For consistency, the same discount rate used in the valuation of the benefit obligations is used to place a value on the plan assets. The assets are assumed to grow each year in line with the discount rate, and therefore, the expected return on the assets is set equal to the discount rate. The fair value of the plan assets in Switzerland was $1.6 million at December 31, 2020 and $1.2 million at December 31, 2019. Due to the plan amendment in 2020 that changed the benefit structure of the Netherlands plan, the Company no longer has any obligation related to this plan beyond the payment of insurance premiums. Therefore, there is no projected benefit obligation and no plan assets in the Netherlands as of December 31, 2020. Plan assets for the Netherlands plan totaled $0.6 million at December 31, 2019. The Company classifies the fair value of its plan assets as Level 2 in the fair value hierarchy as discussed in Note 6.

During the years ended December 31, 2020, 2019 and 2018, employees in the Netherlands and Switzerland made contributions to the respective pension plans aggregating $21,000, $24,000 and $5,000, respectively. Employee contributions to these plans are based on a fixed 5% of the relevant pensionable earnings. The Company funds these plans by contributing at least the minimum amount required by applicable regulations and as recommended by an independent actuary. During the years ended December 31, 2020, 2019 and 2018, the Company contributed $0.8 million, $0.1 million and $0.3 million, respectively, to its pension plans. The Company expects to contribute $1.2 million to its defined benefit plans in 2021.

(25) INCOME TAXES

The components of income (loss) from continuing operations before income taxes consisted of the following (in thousands):

	Year ended December 31,		
	2020	2019	2018
Income (loss) before income taxes:			
United States	$ 123,817	$ (132,887)	$ (52,569)
Foreign	(30,500)	9,994	(20,841)
	$ 93,317	$ (122,893)	$ (73,410)

The provision for income taxes from continuing operations consisted of the following (in thousands):

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Notes to Consolidated Financial Statements (Continued)

	Year ended December 31,		
	2020	2019	2018
Provision (benefit) for income taxes:			
Current:			
Federal	$ 677	$ 11	$ 561
State	1,310	128	128
Foreign	7,355	1,744	2,198
Total current	9,342	1,883	2,887
Deferred:			
Federal	30,278	9,790	(8,481)
State	195	1,630	(1,414)
Foreign	(16,117)	383	(1,477)
Change in valuation allowance	(18,972)	(6,504)	11,885
Total deferred	(4,616)	5,299	513
Total	$ 4,726	$ 7,182	$ 3,400

A reconciliation of the Company's effective tax rate for continuing operations to the statutory federal rate is as follows:

	Year ended December 31,		
	2020	2019	2018
U.S. statutory income tax rate	21.0 %	21.0 %	21.0 %
State income taxes, net of federal benefit	1.1	(0.2)	(0.1)
Foreign income taxes	2.9	(1.0)	(5.7)
Foreign deemed dividends	(2.7)	(0.4)	(3.4)
Stock-based compensation	1.0	(0.7)	(0.3)
Tax credits	(2.8)	2.8	0.6
Uncertain tax positions	0.5	(0.2)	1.3
Valuation allowance	(20.3)	(0.7)	(16.1)
Goodwill amortization	0.6	0.4	0.3
Tax reform	—	(0.1)	—
Goodwill impairment	—	(25.4)	—
Other permanent adjustments	1.8	(1.5)	(1.4)
Permanent adjustments - foreign exchange	1.8	—	(0.9)
Other, net	0.2	0.2	0.1
Effective income tax rate	5.1 %	(5.8)%	(4.6)%

The following is a summary of the significant components of deferred income tax assets and liabilities (in thousands):

	December 31, 2020	December 31, 2019
Assets:		
Net operating loss carryforwards	$ 447,101	$ 61,057
Capital loss carryforward	71,182	—
Research and development tax credits	45,031	32,879
Other tax credits	6,400	—
Deferred revenue	3,184	7,868
Accrued expenses	13,557	5,687
Inventory	2,603	4,618
Stock-based compensation	1,668	2,880
Fixed assets	4,613	5,461
Other temporary differences	4,051	2,138
	599,390	122,588
Valuation allowance	(496,439)	(94,980)
Total deferred tax assets	102,951	27,608
Liabilities:		
Intangible assets	(75,794)	(22,470)
Mark-to-market investments	(17,631)	—
Unremitted foreign income	(15,717)	(4,827)
Total deferred tax liabilities	(109,142)	(27,297)
Total net deferred tax assets	$ (6,191)	$ 311

The deferred tax assets and liabilities based on tax jurisdictions are presented in the Company's consolidated balance sheets as follows:

	December 31, 2020	December 31, 2019
Deferred income taxes - noncurrent assets	$ 10,651	$ 4,959
Deferred income taxes - noncurrent liabilities	(16,842)	(4,648)
	$ (6,191)	$ 311

The largest increases in the year ended December 31, 2020 compared to the year ended December 31, 2019, including net operating loss carryforwards, intangible assets and the valuation allowance were primarily the result of the ECI Acquisition. The change in mark-to-market securities in the year ended December 31, 2020 was related to the Debentures and Warrants received as sale consideration in connection with the Kandy Sale.

At December 31, 2020, the Company had cumulative net operating losses ("NOLs") in the U.S. of $302.1 million. The Company, through the ECI Acquisition, also has $1.6 billion of Israel NOLs. The U.S. NOL carryforwards expire at various dates from 2021 through 2038. The Israel NOLs do not expire.

The Company also has available federal, state and foreign income tax credit carryforwards of $51.4 million that expire at various dates from 2021 through 2039.

Under the provisions of the Internal Revenue Code, the net operating losses and tax credit carryforwards are subject to review and possible adjustment by the Internal Revenue Service. Net operating losses and tax credit carryforwards may become subject to an annual limitation in the event of certain cumulative changes in the ownership of significant shareholders over a three-year period in excess of 50%, as defined under Sections 382 and 383 of the Internal Revenue Code, as well as a similar state provision. As a result of the Edgewater Acquisition in 2018, the Company acquired approximately $34 million of net operating loss carryforwards and approximately $6 million of tax credit carryforwards. Edgewater incurred an ownership change as a result of its acquisition by the Company; however, the Company does not expect that any of the net operating losses or tax credits related to Edgewater will expire unused. As a result of the ECI Acquisition, an additional $129.6 million of NOL was acquired related to the ECI U.S. subsidiary. ECI U.S. incurred an ownership change as a result of its acquisition by the

Company and the Company expects that, due to the limitations under Sections 382 and 383, all but approximately $8 million of the NOLs related to ECI U.S. will expire unused.

During 2020 and 2019, the Company performed an analysis to determine if, based on all available evidence, it considered it more likely than not that some portion or all of the recorded deferred tax assets will not be realized in a future period. As a result of the Company's evaluation, the Company concluded that there was insufficient positive evidence to overcome the more objective negative evidence related to its cumulative losses and other factors. Accordingly, the Company has maintained a valuation allowance against its U.S. deferred tax asset amounting to $73.0 million at December 31, 2020 and $71.4 million at December 31, 2019. A similar analysis and conclusion were made with regard to the valuation allowance on the deferred tax assets of the Company's Ireland subsidiary. The Ireland subsidiary's business model changed in 2020 to a limited risk distributor. As a result, the decision was made to release a portion of the valuation allowance because of the future income resulting in a tax benefit of $4.1 million. The valuation allowance for the capital loss carryforward of $8.8 million will remain, since there are no current plans to generate capital gains. In analyzing the deferred tax assets related to the Company's Canada subsidiaries at such time, the Company concluded that it was more likely than not that the Canadian federal credits would not be realized in a future period. This resulted in the Company's maintaining a valuation allowance of $12.3 million. In addition, because of continued losses, a valuation allowance of $2.3 million was maintained for the Company's Brazil subsidiary. The ECI Acquisition resulted in valuation allowances of $429.0 million against some of the acquired subsidiaries, comprised of $380.0 million related to the ECI Israel subsidiaries, $29.8 million related to ECI in the U.S., $13.7 million related to ECI Netherlands and $5.5 million in the aggregate related to other ECI subsidiaries. The deferred tax assets recognized with no valuation allowance at December 31, 2020 and 2019 primarily relate to foreign subsidiaries where recoverability is concluded to be more likely than not based on the Company's cost-plus compensation policy, as well as a state credit in the U.S.

A reconciliation of the Company's unrecognized tax benefits is as follows (in thousands):

	Year ended December 31,		
	2020	2019	2018
Unrecognized tax benefits at January 1	$ 2,932	$ 3,461	$ 4,528
Increases related to current year tax positions	485	292	74
Increases related to prior period tax positions	11,209	—	122
Decreases related to prior period tax positions	(572)	(821)	(1,263)
Unrecognized tax benefits at December 31	$ 14,054	$ 2,932	$ 3,461

The Company accounts for interest and penalties related to uncertain tax positions as part of its provision for income taxes. The Company had $15.3 million, $3.6 million and $4.1 million of unrecognized tax benefits including penalties and interest at December 31, 2020, 2019 and 2018, respectively. Of these amounts, $13.9 million, $2.0 million and $1.8 million represent the amount of unrecognized tax benefits that, if recognized, would impact the effective income tax rate for the years ended December 31, 2020, 2019 and 2018, respectively. The Company recorded liabilities for potential penalties and interest of $0.5 million, $0.1 million and $0.1 million for the years ended December 31, 2020, 2019 and 2018, respectively. The Company had $1.3 million and $0.7 million accrued in Other long-term liabilities for penalties and interest at December 31, 2020 and 2019, respectively. The Company believes that it is reasonably possible that certain tax positions related to its unrecognized tax benefits will be effectively settled within the next twelve months.

The Company and its subsidiaries file income tax returns in the U.S. federal jurisdiction as well as various state and foreign jurisdictions. Generally, the tax years 2017 through 2020 remain open to examination by the major taxing jurisdictions to which the Company is subject. The Company's federal NOLs generated prior to 2017 could be adjusted on examination even though the year in which the loss was generated is otherwise closed by the statute of limitations.

As of December 31, 2020, the Company had ongoing income tax audits in certain foreign countries. Management believes that an adequate provision has been recorded for any adjustments that may result from tax examinations.

The ECI Acquisition was accounted for as a non-taxable business combination. U.S. federal and state deferred taxes were recorded as part of the business combination based on the differences between the tax basis of the acquired assets and assumed liabilities and their reported amounts for financial reporting purposes. The Company concluded that there was insufficient positive evidence to overcome the more objective negative evidence related to cumulative losses and other factors. The Company recorded identifiable intangible assets in Israel as part of the purchase accounting for the acquisition. For tax

purposes, the future amortization of these identifiable intangible assets will be non-deductible, thereby creating income. ECI Israel has $1.6 billion of NOLs that will be utilizable against the future tax income from these identifiable intangible assets. The Company is required to determine its ability to use the assets and analyze the valuation allowance previously established. The Company has determined it is not more likely that some of these net tax assets, mainly in Israel, will be recognized. As a result, a valuation allowance of $429.0 million has been established against ECI's deferred taxes.

The Anova Acquisition was accounted for as a business combination and the financial results of Anova have been included in the Company's consolidated financial statements for the period subsequent to the Anova Acquisition Date. The transaction is considered an asset acquisition for tax purposes. Accordingly, Ribbon recorded a stepped up basis in the assets.

The Edgewater Acquisition was accounted for as a non-taxable business combination. As a result, the valuation allowance has been reduced for the assumed net deferred tax liabilities, resulting in an income tax benefit of $0.7 million. This benefit was included as a component of the Company's tax provision for the year ended December 31, 2018. In 2019, an adjustment of $0.2 million was recorded, reducing the income tax benefit from the Edgewater Acquisition to $0.5 million.

(26) RELATED PARTIES

As a portion of the consideration for the GENBAND Merger, on October 27, 2017, the Company issued a promissory note for $22.5 million to certain of GENBAND's equity holders who, following the GENBAND Merger, owned greater than five percent of the Company's outstanding shares. As described in Note 14 above, the promissory note did not amortize and the principal thereon was payable in full on the third anniversary of its execution. Interest on the promissory note was payable quarterly in arrears and accrued at a rate of 7.5% per year for the first six months after issuance, and thereafter at a rate of 10% per year. The failure to make any payment under the promissory note when due and, with respect to payment of any interest, the continuation of such failure for a period of thirty days thereafter, constituted an event of default under the promissory note. If an event of default occurs under the promissory note, the payees could have declared the entire balance of the promissory note due and payable (including principal and accrued and unpaid interest) within five business days of the payees' notification to the Company of such acceleration. At December 31, 2018, the Promissory Note balance was $24.1 million, comprised of $22.5 million of principal, plus $1.6 million of interest converted to principal.

On April 29, 2019, the Company repaid in full all outstanding amounts under the Promissory Note, aggregating $24.7 million. The Company did not incur any early termination penalties in connection with this repayment.

(27) COMMITMENTS AND CONTINGENCIES

Litigation Settlement

As previously disclosed, the Company was involved in six lawsuits (together, the "Lawsuits") with Metaswitch Networks Ltd., Metaswitch Networks Corp. and Metaswitch Inc. (collectively, "Metaswitch"). In five of the Lawsuits, the Company was the plaintiff, and in three of those five lawsuits, the Company was also a counterclaim defendant. In the sixth case, the Company was the defendant.

On April 22, 2019, the Company and Metaswitch agreed to a binding mediator's proposal that resolved the six Lawsuits between the Company and Metaswitch (the "Lawsuits"). The Company and Metaswitch signed a Settlement and Cross-License Agreement on May 29, 2019 (the "Royalty Agreement"). Pursuant to the terms of the Royalty Agreement, Metaswitch agreed to pay the Company an aggregate amount of $63.0 million, which included cash payments of $37.5 million during the second quarter of 2019 and $25.5 million payable in three installments annually, beginning June 26, 2020, with such installment payments accruing interest at a rate of 4% per year. As part of the Royalty Agreement, the Company and Metaswitch (i) have released the other from all claims and liabilities; (ii) have licensed each party's existing patent portfolio to the other party; and (iii) have requested the applicable courts to dismiss the Lawsuits. The $63.0 million gain from the settlement is included in Other income (expense), net, in the Company's consolidated statement of operations for the year ended December 31, 2019, and had notes receivable for future payments of $25.5 million, comprised of $8.5 million in Other current assets and $17.0 million in Other assets in the consolidated balance sheet. The Company received $37.5 million of aggregate payments from Metaswitch in the second quarter of 2019 and $9.5 million, including $1.0 million of interest, in the second quarter of 2020.

On July 6, 2020, the Company and Metaswitch signed a First Supplemental Agreement to the Settlement and Cross-License Agreement (the "Supplemental Agreement") under which Metaswitch could elect to repay the outstanding amounts under the Royalty Agreement early in exchange for a reduction of $0.25 million to the outstanding principal, from $17.0 million to $16.75 million, and the payment of no further interest by Metaswitch effective June 26, 2020. The Company recorded the reduction to the outstanding principal as a reduction to interest income. On July 14, 2020, Metaswitch paid the Company the remaining outstanding balance of $16.75 million.

Contingencies

Liabilities for Royalty Payments to the IIA

Prior to the ECI Acquisition, ECI had received research and development grants from the IIA. The Company assumed ECI's contract with the IIA, which requires the Company to pay royalties to the IIA on proceeds from the sale of products which the Israeli government has supported by way of research and development grants. The royalties for grants prior to 2017 were calculated at the rates of 1.3% to 5.0% of the aggregated proceeds from the sale of such products developed at certain of the Company's R&D centers, up to an amount not exceeding 100% of such grants plus interest at LIBOR. Effective for grants approved in 2017 and thereafter, interest was calculated at the higher of LIBOR plus 1.5% to 2.75%. At December 31, 2020, the Company's maximum possible future royalties commitment, including $6.1 million of unpaid royalties accrued at December 31, 2020, was $44.0 million, including interest of $2.0 million, based on estimates of future product sales, grants received from the IIA and not yet repaid, and management's estimation of products still to be sold.

Litigation

On November 8, 2018, Ron Miller, a purported stockholder of the Company, filed a Class Action Complaint (the "Miller Complaint") in the United States District Court for the District of Massachusetts (the "Massachusetts District Court") against the Company and three of its former officers (collectively, the "Defendants"), claiming to represent a class of purchasers of Sonus common stock during the period from January 8, 2015 through March 24, 2015 and alleging violations of the federal securities laws. Similar to a previous complaint entitled Sousa et al. vs. Sonus Networks, Inc. et al., which was dismissed with prejudice by an order dated June 6, 2017, the Miller Complaint claims that the Defendants made misleading forward-looking statements concerning Sonus' expected fiscal first quarter of 2015 financial performance, which statements were also the subject of an August 7, 2018 Securities and Exchange Commission Cease and Desist Order, whose findings the Company neither admitted nor denied. The Miller plaintiffs are seeking monetary damages.

After the Miller Complaint was filed, several parties filed and briefed motions seeking to be selected by the Massachusetts District Court to serve as a Lead Plaintiff in the action. On June 21, 2019, the Massachusetts District Court appointed a group as Lead Plaintiffs and the Lead Plaintiffs filed an amended complaint on July 19, 2019. On August 30, 2019, the Defendants filed a motion to dismiss the Miller Complaint and, on October 4, 2019, the Lead Plaintiffs filed an opposition to the motion to dismiss. The Defendants filed a reply to such opposition on November 1, 2019. There was an oral argument on the motion to dismiss on February 12, 2020.

In addition, the Company is often a party to disputes and legal proceedings that it considers routine and incidental to its business. Management does not expect the results of any of these actions to have a material effect on the Company's business or consolidated financial statements.

(28) QUARTERLY RESULTS (UNAUDITED)

The following tables present the Company's quarterly operating results for the years ended December 31, 2020 and 2019. The information for each of these quarters is unaudited and has been prepared on the same basis as the audited consolidated financial statements. In the opinion of management, all necessary adjustments, consisting only of normal recurring adjustments, have been included to present fairly the unaudited consolidated quarterly results when read in conjunction with the Company's audited consolidated financial statements and related notes.

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

	First Quarter (1)	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Year ended December 31, 2020				
Revenue	$ 157,982	$ 210,493	$ 231,118	$ 244,202
Cost of revenue (3)	67,458	87,226	96,164	99,840
Gross profit (3)	$ 90,524	$ 123,267	$ 134,954	$ 144,362
(Loss) income from operations	$ (28,740)	$ 1,592	$ 11,917	$ 16,900
Net (loss) income	$ (33,170)	$ (8,251)	$ 6,252	$ 123,760
(Loss) earnings per share (4):				
Basic	$ (0.27)	$ (0.06)	$ 0.04	$ 0.85
Diluted	$ (0.27)	$ (0.06)	$ 0.04	$ 0.81
Shares used in computing (loss) earnings per share:				
Basic	120,992	144,483	144,948	145,311
Diluted	120,992	144,483	151,680	153,441

	First Quarter (2)	Second Quarter	Third Quarter (2)	Fourth Quarter
	(In thousands, except per share data)			
Year ended December 31, 2019				
Revenue	$ 118,928	$ 145,421	$ 137,653	$ 161,109
Cost of revenue (3)	52,694	54,656	49,254	51,850
Gross profit (3)	$ 66,234	$ 90,765	$ 88,399	$ 109,259
Loss (income) from operations	$ (36,228)	$ (7,096)	$ 2,686	$ (148,822)
Net (loss) income	$ (30,832)	$ 49,470	$ 1,650	$ (150,363)
Loss (earnings) per share (4):				
Basic	$ (0.29)	$ 0.45	$ 0.01	$ (1.36)
Diluted	$ (0.29)	$ 0.45	$ 0.01	$ (1.36)
Shares used in computing loss (earnings) per share:				
Basic	108,167	110,394	110,080	110,269
Diluted	108,167	110,698	110,756	110,269

(1) Includes the results of ECI for the period subsequent to March 3, 2020.
(2) Includes the results of Anova for the period subsequent to February 28.
(3) Reflects the reductions to Cost of revenue arising from the reclassification of amortization of acquired intangible assets to operating expenses in 2020 of $9.0 million in the first quarter, $11.0 million in the second quarter and $11.6 million in the third quarter; and in 2019 of $9.7 million in the first quarter, $10.1 million in the second quarter, $9.5 million in the third quarter and $8.3 million in the fourth quarter.
(4) (Loss) earnings per share is calculated independently for each of the quarters presented; accordingly, the sum of the quarterly (loss) earnings per share amounts may not equal the total calculated for the year.

Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Disclosure Controls and Procedures

Our management, with the participation of our principal executive officers and principal financial officer, 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 Annual Report on Form 10-K. Based on this evaluation, our principal executive officers and principal financial officer concluded that our disclosure controls and procedures were effective as of December 31, 2020.

Management's Annual Report on Internal Control over Financial Reporting

Our management, with the participation of our principal executive officers and principal financial officer, is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Our internal control system is designed to provide reasonable assurance to our management and Board of Directors regarding the preparation and fair presentation of published financial statements.

Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2020. In making its assessment of internal control over financial reporting, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in *Internal Control—Integrated Framework (2013)*. Based on this assessment, management concluded that, as of December 31, 2020, our internal control over financial reporting was effective.

Our evaluation excluded ECI Telecom Group Ltd ("ECI"), which was acquired on March 3, 2020. Our Consolidated Statement of Operations for the year ended December 31, 2020 included revenue of approximately $261 million and our Consolidated Balance Sheet as of December 31, 2020 included total assets of approximately $186 million attributable to ECI. In accordance with guidance issued by the Securities and Exchange Commission, companies are allowed to exclude acquisitions from their assessment of internal control over financial reporting during the first year subsequent to the acquisition while integrating the acquired operations.

Deloitte & Touche LLP, an independent registered public accounting firm that audited our financial statements included in this Annual Report on Form 10-K, has issued an attestation report on management's internal control over financial reporting, which is included in this Item 9A under the caption "Report of Independent Registered Public Accounting Firm."

Changes in Internal Control over Financial Reporting

There have been no changes in our internal control over financial reporting during the fiscal quarter ended December 31, 2020 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and the Board of Directors of Ribbon Communications Inc.

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of Ribbon Communications Inc. and subsidiaries (the "Company") as of December 31, 2020, based on criteria established in *Internal Control —Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on criteria established *in Internal Control — Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2020, of the Company and our report dated February 26, 2021, expressed an unqualified opinion on those financial statements.

As described in Management's Annual Report on Internal Control over Financial Reporting, management excluded from its assessment the internal control over financial reporting at ECI Telecom Group Ltd. ("ECI"), which was acquired on March 3, 2020, and whose financial statements constitute $186 million of total assets and $261 million of revenues of the consolidated financial statement amounts as of and for the year ended December 31, 2020. Accordingly, our audit did not include the internal control over financial reporting at ECI.

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/ Deloitte & Touche LLP

Dallas, Texas
February 26, 2021

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

Our board of directors has adopted a Code of Conduct applicable to all officers, directors and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. A copy of the code is available at the Investor Relations section of our website, located at investors.ribboncommunications.com, under "Corporate Governance - Governance Highlights." We intend to make any disclosure required by law or Nasdaq Stock Market rules regarding any amendments to, or waivers from, any provisions of the code at the same location of our website.

The information required by this Item 10 is included in our definitive Proxy Statement with respect to our 2021 Annual Meeting of Stockholders to be filed with the SEC not later than 120 days after the end of the fiscal year ended December 31, 2020 and is incorporated herein by reference.

Item 11. Executive Compensation

The information required by this Item 11 is included in our definitive Proxy Statement with respect to our 2021 Annual Meeting of Stockholders to be filed with the SEC not later than 120 days after the end of the fiscal year ended December 31, 2020 and is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this Item 12 is included in our definitive Proxy Statement with respect to our 2021 Annual Meeting of Stockholders to be filed with the SEC not later than 120 days after the end of the fiscal year ended December 31, 2020 and is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this Item 13 is included in our definitive Proxy Statement with respect to our 2021 Annual Meeting of Stockholders to be filed with the SEC not later than 120 days after the end of the fiscal year ended December 31, 2020 and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services

The information required by this Item 14 will be included in our definitive Proxy Statement with respect to our 2021 Annual Meeting of Stockholders to be filed with the SEC not later than 120 days after the end of the fiscal year ended December 31, 2020 and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules

1) Financial Statements

The consolidated financial statements of the Company are listed in the index under Part II, Item 8, of this Annual Report on Form 10-K.

2) Financial Statement Schedules

None. All schedules are omitted because they are not applicable, not required under the instructions or the information is contained in the consolidated financial statements, or notes thereto, included herein.

3) List of Exhibits

The Exhibits filed as part of this Annual Report on Form 10-K are listed in the Exhibit Index immediately preceding the signature page of this Annual Report, which Exhibit Index is incorporated herein by reference.

Item 16. Form 10-K Summary

None.

EXHIBIT INDEX

Exhibit No.	Description
2.1 **	Agreement and Plan of Merger, dated as of May 23, 2017, by and among the registrant, Sonus, Inc., Solstice Sapphire, Inc., Green Sapphire Investments LLC, Green Sapphire LLC, GENBAND Holdings Company, GENBAND Inc., and GENBAND II, Inc. (incorporated by reference to Exhibit 2.1 to Sonus, Inc.'s Current Report on Form 8-K, filed May 23, 2017 with the SEC).
2.2 **	Agreement and Plan of Merger, dated June 24, 2018, by and among the Registrant, Kansas Merger Sub, Inc., Edgewater Networks, Inc. and Shareholder Representative Services LLC (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q, filed August 1, 2018 with the SEC).
2.3 **	Agreement and Plan of Merger, dated as of November 14, 2019, by and among the Registrant, Ribbon Communications Israel Ltd., Eclipse Communications Ltd., ECI Telecom Group Ltd. and ECI Holding (Hungary) Korlátolt Felelősségű Társaság (incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K, filed November 14, 2019 with the SEC).
2.4 **	Amended and Restated Purchase Agreement, dated December 1, 2020, among Ribbon Communications Inc., Ribbon Communications Operating Company, Inc., Ribbon Communications International Limited and American Virtual Cloud Technologies, Inc. (incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K, filed December 7, 2020 with the SEC).
3.1	Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K12B, filed October 30, 2017 with the SEC).
3.2	Certificate of Amendment of the Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K, filed November 28, 2017 with the SEC).
3.3	Amended and Restated By-Laws of the Registrant (incorporated by reference to Exhibit 3.3 to the Registrant's Annual Report on Form 10-K, filed March 8, 2018 with the SEC).
4.1	Description of Capital Stock (incorporated by reference to Exhibit 4.1 to the Registrant's Annual Report on Form 10-K, filed February 28, 2020).
10.1	First Amended and Restated Stockholders Agreement, dated as of March 3, 2020, by and among the Registrant, JPMC Heritage Parent LLC, Heritage PE (OEP)Heritage Parent LLC, Heritage PE (OEP) III, L.P. and ECI Holding (Hungary) Kft (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed March 3, 2020 with the SEC).
10.2	First Amended and Restated Registration Rights Agreement, dated as of March 3, 2020, by and among the Registrant, JPMC Heritage Parent LLC, Heritage PE (OEP) III, L.P. and ECI Holding (Hungary) Kft (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K, filed March 3, 2020 with the SEC).
10.3 +	Form of Indemnity Agreement for Officers and Directors (incorporated by reference to Exhibit 10.5 to the registrant's Annual Report on Form 10-K, filed March 8, 2018 with the SEC).
10.4 +	Amended and Restated 2000 Employee Stock Purchase Plan, (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q, filed October 31, 2018 with the SEC).
10.5 +	Senior Management Cash Incentive Plan, dated October 27, 2017 (incorporated by reference to Exhibit 10.7 to the Registrant's Annual Report on Form 10-K, filed March 8, 2018 with the SEC).
10.6 +	2008 Stock Incentive Plan of the Registrant (incorporated by reference to Exhibit 99.1 to the Registrant's Registration Statement on Form S-8, filed October 31, 2017 with the SEC).
10.7 +	Form of Nonstatutory Stock Option Award Agreement Granted under the 2008 Stock Incentive Plan (incorporated by reference to Exhibit 10.29 to Sonus, Inc.'s Annual Report on Form 10-K, filed March 6, 2013 with the SEC).
10.8 +	2012 Amended Performance Technologies Incorporated Omnibus Incentive Plan (incorporated by reference to Exhibit 99.2 to the Registrant's Registration Statement on Form S-8, filed with the SEC effective October 31, 2017).
10.9 +	Form of Non-Qualified Stock Option Award Agreement Granted under the 2012 Amended Performance Technologies, Incorporated Omnibus Incentive Plan (incorporated by reference to Exhibit 10.7 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed April 29, 2014 with the SEC).
10.10 +	Employment Agreement between the Registrant and Kevin Riley, dated July 30, 2014 (incorporated by reference to Exhibit 10.1 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed April 29, 2016 with the SEC).

10.11 +	Amended and Restated Stock Incentive Plan of the Registrant (incorporated by reference to Exhibit 99.3 to the Registrant's Registration Statement on Form S-8, filed with the SEC on October 31, 2017).
10.12 +	Form of Nonstatutory Stock Option Award Agreement Granted under the Amended and Restated Stock Incentive Plan (incorporated by reference to Exhibit 10.2 to Sonus, Inc.'s Quarterly Report on Form 10-Q filed July 29, 2016 with the SEC).
10.13 +	Form of Restricted Stock Award Agreement Granted under the Amended and Restated Stock Incentive Plan (incorporated by reference to Exhibit 10.3 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed July 29, 2016 with the SEC).
10.14 +	Form of Restricted Stock Unit Award Agreement (Performance-Based Vesting) for Awards Granted under the Amended and Restated Stock Incentive Plan (incorporated by reference to Exhibit 10.4 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed July 29, 2016 with the SEC).
10.15 +	Form of Restricted Stock Unit Award Agreement (Time-Based Vesting) for Awards Granted under the Amended and Restated Stock Incentive Plan (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q, filed August 1, 2018 with the SEC).
10.16 +	Amended and Restated Employment Agreement between the Registrant and Daryl Raiford, effective as of December 24, 2010, as amended on December 13, 2016 (incorporated by reference to Exhibit 10.30 to the Registrant's Annual Report on Form 10-K, filed March 8, 2018 with the SEC).
10.17 +	Retention Bonus Agreement between the Registrant and Daryl Raiford, dated as of December 12, 2016 (incorporated by reference to Exhibit 10.31 to the Registrant's Annual Report on Form 10-K, filed March 8, 2018 with the SEC).
10.18 +	Edgewater Networks, Inc. Amended and Restated 2002 Stock Option Plan, effective as of April 8, 2010 (incorporated by reference to Exhibit 99.1 to the Registrant's Registration Statement on Form S-8, filed August 6, 2018 with the SEC).
10.19 +	Amendment to the Edgewater Networks, Inc. Amended and Restated 2002 Stock Option Plan, dated December 7, 2016 (incorporated by reference to Exhibit 99.2 to the Registrant's Registration Statement on Form S-8, filed August 6, 2018 with the SEC).
10.20	Senior Secured Credit Facilities Amended and Restated Credit Agreement by and among the Registrant, as a guarantor, Ribbon Communications Operating Company, Inc., as the borrower, Silicon Valley Bank, as administrative agent, issuing lender, swingline lender and joint lead arranger, Citizens Bank, N.A., as lender and joint lead arranger, SunTrust Bank, as lender and documentation agent, and the other lenders party thereto, dated April 29, 2019 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed May 2, 2019 with the SEC).
10.21	Senior Secured Credit Facilities Credit Agreement, dated March 3, 2020, among the Company, as guarantor, Ribbon Communications Operating Company, Inc., as the borrower, Citizens Bank, N.A., as administrative agent, a lender, issuing lender, swingline lender, joint lead arrangers and bookrunner, Santander Bank, National Association, as a lender, joint lead arranger and bookrunner, and the other lenders party thereto (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed March 4, 2020 with the SEC).
10.22	First Amendment to Credit Agreement, dated August 18, 2020, among Ribbon Communications Operating Company, Inc., as the borrower and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed August 24, 2020 with the SEC).
10.23 *	Second Amendment to Credit Agreement and Consent, dated December 1, 2020, among Ribbon Communications Operating Company, Inc., as the borrower and Citizens Bank, N.A., as administrative agent.
10.24 +	Employment Agreement by and between the Registrant and Anthony Scarfo, dated January 18, 2019 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q, filed May 2, 2019 with the SEC).
10.25 +	Employment Agreement by and between GENBAND and Steven Bruny, dated February 7, 2015 (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q, filed May 2, 2019 with the SEC).
10.26 +	Severance Agreement, dated as of January 29, 2020, among Ribbon Communications Inc., Ribbon Communications Operating Company, Inc. and Steven Bruny (incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K, filed January 30, 2020 with the SEC).
10.27 +	Severance Agreement, dated as of January 29, 2020, among Ribbon Communications Inc., Ribbon Communications Operating Company, Inc. and Anthony Scarfo (incorporated by reference to Exhibit 10.2 of the Registrant's Current Report on Form 8-K, filed January 30, 2020 with the SEC).

10.28 +	Ribbon Communications Inc. 2019 Incentive Award Plan (incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K, filed June 11, 2019 with the SEC).
10.29 +	Form of Non-Statutory Stock Option Award Agreement under the 2019 Incentive Award Plan (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q, filed October 31, 2019 with the SEC).
10.30 +	Form of Restricted Stock Award Agreement under the 2019 Incentive Award Plan (incorporated by reference to Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q, filed October 31, 2019 with the SEC).
10.31 +	Form of Restricted Stock Unit Award Agreement (Time-Based Vesting) under the 2019 Incentive Award Plan (incorporated by reference to Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q, filed October 31, 2019 with the SEC).
10.32 +	Form of Restricted Stock Unit Award Agreement (Performance-Based Vesting) under the 2019 Incentive Award Plan (incorporated by reference to Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q, filed October 31, 2019 with the SEC).
10.33 +	Letter Agreement, dated as of December 27, 2019, among the Registrant, Ribbon Communications Operating Company, Inc. and Franklin W. Hobbs (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed January 2, 2020 with the SEC).
10.34 +	Letter Agreement, dated as of February 18, 2000, among Ribbon Communications Inc., Sonus Networks, Inc. d/b/a Ribbon Communications Operating Company, Inc. and Bruce McClelland (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed February 19, 2020 with the SEC.
10.35 +	Severance Agreement, dated February 18, 2020, among Ribbon Communications Inc., Sonus Networks, Inc. d/b/a Ribbon Communications Operating Company, Inc. and Bruce McClelland (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K, filed February 19, 2020 with the SEC).
10.36 +	Form of Restricted Stock Unit Award Agreement (Performance-Based Vesting) between Ribbon Communications Inc. and Bruce McClelland (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K, filed February 19, 2020 with the SEC).
10.37 +	Employment Agreement between the Registrant and Miguel Lopez, dated June 22, 2020 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed June 23, 2020 with the SEC).
10.38 +	Severance Agreement between the Registrant and Miguel Lopez, dated June 22, 2020 (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K, filed June 23, 2020 with the SEC).
10.39 +	Form of Consent to Temporary Wage Reduction entered into with Executive Officers (incorporated by reference to Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q, filed August 6, 2020 with the SEC).
10.40 +	Ribbon Communications Inc. Amended and Restated 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.1 to the Registrant's Form S-8 Registration Statement, filed June 2, 2020 with the SEC).
10.41	Amended and Restated Voting Agreement, dated December 1, 2020, by and among Ribbon Communications Operating Company, Inc., Ribbon Communications International Limited and Pensare Sponsor Group, LLC (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed December 7, 2020 with the SEC).
10.42	Amended and Restated Voting Agreement, dated December 1, 2020, by and among Ribbon Communications Inc., Ribbon Communications Operating Company, Inc., Ribbon Communications International Limited and Stratos Management Systems Holdings, LLC (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K, filed December 7, 2020 with the SEC).
10.43	Investor Rights Agreement, dated December 1, 2020, by and among Ribbon Communications Inc., Pensare Sponsor Group, LLC and Stratos Management Systems Holdings, LLC (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8K, filed December 7 2020 with the SEC).
21.1 *	Subsidiaries of the Registrant.
23.1 *	Consent of Independent Registered Public Accounting Firm, Deloitte & Touche LLP
31.1 *	Certification of Ribbon Communications Inc. Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2 *	Certification of Ribbon Communications Inc. Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.

32.1 #	Certification of Ribbon Communications Inc. Chief Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2 #	Certification of Ribbon Communications Inc. Chief Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS *	Inline XBRL Instance Document
101.SCH *	Inline XBRL Taxonomy Extension Schema
101.CAL *	Inline XBRL Taxonomy Extension Calculation Linkbase
101.DEF *	Inline XBRL Taxonomy Extension Definition Linkbase
101.LAB *	Inline XBRL Taxonomy Extension Label Linkbase
101.PRE *	Inline XBRL Taxonomy Extension Presentation Linkbase
104 *	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

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* Filed herewith.

\# Furnished herewith.

\+ Management contract or compensatory plan or arrangement filed in response to Item 15(a)(3) of the Instructions to the Annual Report on Form 10-K.

** Certain schedules and exhibits have been omitted pursuant to Item 601(b)(2) of Regulation S-K. The Registrant hereby undertakes to furnish copies of any of the omitted schedules and exhibits upon request by the U.S. Securities and Exchange Commission.

SIGNATURES

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

RIBBON COMMUNICATIONS INC.

February 26, 2021

By: /s/ Bruce McClelland
Bruce McClelland
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

Signature	Title	Date
/s/ Bruce McClelland Bruce McClelland	President and Chief Executive Officer (Principal Executive Officer)	February 26, 2021
/s/ Miguel A. Lopez Miguel A. Lopez	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 26, 2021
/s/ Eric Marmurek Eric Marmurek	Senior Vice President, Finance (Principal Accounting Officer)	February 26, 2021
/s/ Shaul Shani Shaul Shani	Chairman	February 26, 2021
/s/ Mariano S. de Beer Mariano S. de Beer	Director	February 26, 2021
/s/ Stewart Ewing Stewart Ewing	Director	February 26, 2021
/s/ Bruns H. Grayson Bruns H. Grayson	Director	February 26, 2021
/s/ Beatriz V. Infante Beatriz V. Infante	Director	February 26, 2021
/s/ Krish Prabhu Krish Prabhu	Director	February 26, 2021
/s/ Rick W. Smith Rick W. Smith	Director	February 26, 2021
/s/ Tanya Tamone Tanya Tamone	Director	February 26, 2021

Exhibit 10.23

SECOND AMENDMENT TO CREDIT AGREEMENT AND CONSENT

THIS SECOND AMENDMENT TO CREDIT AGREEMENT AND CONSENT (this "***Amendment***"), dated as of December 1, 2020, is by and among **RIBBON COMMUNICATIONS OPERATING COMPANY, INC.**, a Delaware corporation formerly known as Sonus Networks, Inc. (the "***Borrower***"), the other Loan Parties, the Lenders (as hereinafter defined) party hereto (constituting, for the avoidance of doubt, "Required Lenders" (as defined in the Credit Agreement (as hereinafter defined))) and **CITIZENS BANK, N.A.**, as administrative agent for the Lenders hereunder (in such capacity, the "***Administrative Agent***"). Capitalized terms used herein and not otherwise defined herein shall have the meanings ascribed thereto in the Credit Agreement (as hereinafter defined).

W I T N E S S E T H

WHEREAS, the Loan Parties, certain banks and financial institutions from time to time party thereto (the "***Lenders***") and the Administrative Agent are parties to that certain Credit Agreement dated as of March 3, 2020 (as amended by that certain First Amendment to Credit Agreement dated as of August 18, 2020, and as further amended, modified, extended, restated, replaced or supplemented from time to time prior to the date hereof, the "***Existing Credit Agreement***"; and, as amended by this Amendment, the "***Credit Agreement***"); and

WHEREAS, the Loan Parties have informed the Administrative Agent that (a) pursuant to and in accordance with the terms of the Amended and Restated Purchase Agreement (the "***Purchase Agreement***") dated as of December 1, 2020, by and among Holdings, the Borrower, Ribbon Communications International Limited, an Ireland company ("***Ribbon Ireland***") and American Virtual Cloud Technologies, Inc. ("***AVCT***") (which amends and restates the Purchase Agreement dated as of August 5, 2020, by and among Holdings, the Borrower, Ribbon Ireland and AVCT), (i) the Borrower intends to dispose of 100% of the Capital Stock of Kandy Communications LLC, an Immaterial Subsidiary, and (ii) the Borrower and Ribbon Ireland intend to dispose of (and cause certain of their subsidiaries to dispose of) the Transferred Assets (as defined in the Purchase Agreement), in exchange for the issuance by AVCT to Holdings of $45,000,000, subject to certain adjustments, in principal amount of units, consisting of convertible debentures and common stock warrants (the foregoing transactions, collectively, the "***Equity Exchange Transaction***"), (b) after giving effect to the Equity Exchange Transaction, Holdings shall own approximately 26.62% of the issued and outstanding Capital Stock of AVCT, on a fully diluted basis and (c) the Equity Exchange Transaction constitutes an "Investment" (as defined in the Credit Agreement) that would not be permitted under Section 7.8 of the Existing Credit Agreement;

WHEREAS, the Loan Parties have requested that the Required Lenders (a) consent to the Equity Exchange Transaction and (b) amend certain provisions of the Credit Agreement; and

WHEREAS, the Required Lenders are willing to consent to the Equity Exchange Transaction and make such amendments to the Credit Agreement, in each case in accordance with and subject to the terms and conditions set forth herein.

NOW, THEREFORE, in consideration of the agreements hereinafter set forth, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the parties hereto agree as follows:

ARTICLE I
CONSENT

1.1 **Consent.** Notwithstanding the provisions of Section 7.8 of the Credit Agreement to the contrary, the Required Lenders hereby consent to the Equity Exchange Transaction; provided, that (a) the Equity Exchange Transaction shall occur on or before December 11, 2020 and (b) as of the closing date of the Equity Exchange Transaction, no cash consideration shall be paid by the Loan Parties or their Subsidiaries in connection with the acquisition by Holdings of the Capital Stock of AVCT.

1.2 **Effectiveness of Consent**. The above consent shall be effective only to the extent specifically set forth herein and shall not (a) be construed as a consent to any breach, Default or Event of Default other than as specifically consented to herein nor as a consent to any breach, Default or Event of Default of which the Lenders have not been informed by the Loan Parties, (b) affect the right of the Lenders to demand compliance by the Loan Parties with all terms and conditions of the Loan Documents, except as specifically set forth herein, (c) be deemed a consent to or waiver of any transaction or future action on the part of the Loan Parties requiring the Lenders' or the Required Lenders' consent or approval under the Loan Documents, except as specifically set forth herein or (d) be deemed or construed to be a waiver or release of, or a limitation upon, the Administrative Agent's or the Lenders' exercise of any rights or remedies under the Credit Agreement or any other Loan Document, whether arising as a consequence of any Default or Event of Default which may now exist or otherwise, all such rights and remedies hereby being expressly reserved**.**

ARTICLE II
AMENDMENTS TO CREDIT AGREEMENT

The Existing Credit Agreement is hereby amended in the following respects:

2.1 **Amendment to Definition of Excess Cash Flow**. Subclause (iii) appearing in clause (b) of the definition of Excess Cash Flow set forth in Section 1.1 of the Existing Credit Agreement is hereby amended and restated in its entirety to read as follows:

(iii) the aggregate amount of all regularly scheduled and mandatory principal payments of all Indebtedness of Group Members made in cash during such period (other than in respect of Term Loans, Incremental Term Loans, Extended Term Loans or Credit Agreement Refinancing Indebtedness to the extent such payment is made with the proceeds received from the issuance or incurrence of long-term Indebtedness (other than revolving Indebtedness)), plus

2.2 **Amendment to Section 7.8(n)**. Subclause (x) appearing in Section 7.8(n) of the Existing Credit Agreement is hereby amended and restated in its entirety to read as follows:

(x) no Indebtedness of the Person or assets being purchased or acquired is assumed or incurred in connection with any such purchase or acquisition other than Indebtedness permitted by the terms of Section 7.2(j);

ARTICLE III
CONDITIONS TO EFFECTIVENESS

3.1 Closing Conditions. This Amendment shall become effective as of the date first written above (the "***Amendment Effective Date***") upon satisfaction of the following conditions (in each case, in form and substance reasonably acceptable to the Required Lenders):

1. Executed Amendment. The Administrative Agent shall have received a copy of this Amendment duly executed by each of the Loan Parties and the Required Lenders. For the avoidance of doubt, neither consent of the Administrative Agent nor delivery of a signature page executed by the Administrative Agent is a condition to the effectiveness of this Amendment.

2. Fees and Expenses. The Administrative Agent shall have received all fees required to be paid on the Amendment Effective Date, and all reasonable and documented fees and expenses for which invoices have been presented (including the reasonable and documented fees and expenses of legal counsel to the Administrative Agent to the extent invoiced in reasonable detail at least two Business Days prior to the Amendment Effective Date (except as otherwise reasonably agreed by the Borrower)).

ARTICLE IV
MISCELLANEOUS

4.1 Amended Terms. On and after the Amendment Effective Date, all references to the Credit Agreement in each of the Loan Documents shall hereafter mean the Credit Agreement (as defined herein). Except as specifically amended hereby or otherwise agreed, the Credit Agreement is hereby ratified and confirmed and shall remain in full force and effect according to its terms.

4.2 Representations and Warranties of Loan Parties. Each of the Loan Parties represents and warrants as follows:

(a) (i) Each Loan Party has the power and authority, and the legal right, to make, deliver and perform this Amendment; (b) each Loan Party has taken all necessary organizational or corporate action to authorize the execution, delivery and performance of this Amendment; (c) no material Governmental Approval or consent or authorization of, filing with, notice to or other act by or in respect of, any other Person is required in connection with the execution, delivery, performance, validity or enforceability of this Amendment, except Governmental Approvals, consents, authorizations, filings and notices that have been obtained or made and are in full force and effect; (d) this Amendment has been duly executed and delivered on behalf of each Loan Party party hereto; (e) this Amendment constitutes a legal, valid and binding obligation of each Loan Party party hereto, enforceable against each such Loan Party in accordance with its terms, except as enforceability may be limited by applicable bankruptcy, insolvency, reorganization, moratorium or similar laws affecting the enforcement of creditors' rights generally and by general equitable principles (whether enforcement is sought by proceedings in equity or at law).

1. Each of the representations and warranties made by each Loan Party in or pursuant to any Loan Document (i) that is qualified by materiality is true and correct in all respects, and (ii) that is not qualified by materiality, is true and correct in all material respects, in each case, on and as of the Amendment Effective Date as if made on and as of the Amendment Effective Date, except to the extent any such representation and warranty expressly relates to an earlier date, in which case such representation and warranty shall have been true and correct in all material respects as of such earlier date (or in all respects to the extent such representation and warranty is qualified by materiality).

2. No Default or Event of Default has occurred and is continuing as of or on the Amendment Effective Date or after giving effect to this Amendment.

3. The Loan Documents continue to create a valid security interest in, and Lien upon, the Collateral, in favor of the Administrative Agent, for the benefit of the Secured Parties, which security interests and Liens are perfected in accordance with the terms of the Loan Documents and prior to all Liens other than Liens permitted pursuant to Section 7.3 of the Credit Agreement.

4. Other than as set forth herein, the Obligations are not reduced or modified by this Amendment and are not subject to any offsets, defenses or counterclaims.

4.3 Reaffirmation of Obligations. Each Loan Party hereby ratifies the Credit Agreement and acknowledges and reaffirms (a) that it is bound by all terms of the Credit Agreement applicable to it and (b) that it is responsible for the observance and full performance of its respective Obligations.

4.4 Loan Document. This Amendment shall constitute a Loan Document under the terms of the Credit Agreement.

4.5 Expenses. The Borrower agrees to pay all reasonable and documented out of pocket costs and fees and expenses of the Administrative Agent in connection with the preparation, execution and delivery of this Amendment, including without limitation the reasonable and documented out of pocket fees and expenses of the Administrative Agent's outside legal counsel.

4.6 Further Assurances. The Loan Parties agree to promptly take such action, upon the request of the Administrative Agent, as is necessary to carry out the intent of this Amendment.

4.7 Entirety. This Amendment and the other Loan Documents embody the entire agreement among the parties hereto and supersede all prior agreements and understandings, oral or written, if any, relating to the subject matter hereof.

4.8 Counterparts; Telecopy. This Amendment may be executed in multiple counterparts, each of which shall constitute an original but all of which when taken together shall constitute one contract. Delivery of an executed signature page counterpart hereof by telecopy, emailed pdf. or any other electronic means that reproduces an image of the actual executed signature page shall be effective as delivery of a manually executed counterpart hereof. The words "execution," "signed," "signature," "delivery," and words of like import in or relating to any document to be signed in connection with this Amendment and the transactions contemplated hereby shall be deemed to include electronic signatures, the electronic association of signatures and records on electronic platforms, deliveries or the keeping of records in electronic form, each of which shall be of the same legal effect, validity or enforceability as a manually executed signature, physical delivery thereof or the use of a paper-based recordkeeping system, as the case may be, to the extent and as provided for in any applicable law, including the Federal Electronic Signatures in Global and National Commerce Act, the New York State Electronic Signatures and Records Act, any other similar state laws based on the Uniform Electronic Transactions Act or the Uniform Commercial Code, each as amended, and the parties hereto hereby waive any objection to the contrary, provided that nothing herein shall require the Administrative Agent to accept electronic signature counterparts in any form or format after the date hereof.

4.9 No Actions, Claims, Etc. As of the date hereof, each of the Loan Parties hereby acknowledges and confirms that it has no knowledge of any actions, causes of action, claims, demands, damages and liabilities of whatever kind or nature, in law or in equity, against the Administrative Agent, the Lenders, or the Administrative Agent's or the Lenders' respective officers, employees,

representatives, agents, counsel or directors arising from any action by such Persons, or failure of such Persons to act under the Credit Agreement on or prior to the date hereof.

4.10 GOVERNING LAW. THIS AMENDMENT SHALL BE GOVERNED BY, AND SHALL BE CONSTRUED AND ENFORCED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK (INCLUDING SECTIONS 5-1401 AND 5-1402 OF THE NEW YORK GENERAL OBLIGATIONS LAW).

4.11 Successors and Assigns. This Amendment shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

4.12 Submission to Jurisdiction; Waivers. The jurisdiction, service of process, venue and waiver of jury trial provisions set forth in Section 10.14 of the Credit Agreement are hereby incorporated by reference, *mutatis mutandis*.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

In Witness Whereof, the parties hereto have caused this Amendment to be duly executed and delivered by their proper and duly authorized officers as of the day and year first above written.

BORROWER:

RIBBON COMMUNICATIONS OPERATING COMPANY, INC.

By: __

Name: __

Title: __

LOAN PARTIES:

RIBBON COMMUNICATIONS INC.

By: __

Name: __

Title: __

RIBBON COMMUNICATIONS OPERATING COMPANY, INC.

By: __

Name: __

Title: __

EDGEWATER NETWORKS, INC.

By: __

Name: __

Title: __

GENBAND INC.

By: __

Name: __

Title: __

ADMINISTRATIVE AGENT:

CITIZENS BANK, N.A.
as the Administrative Agent and a Lender

By: __

Name: __

Title: __

LENDERS:

[__________],
as a Lender

By: __

Name: __

Title: __

EXHIBIT 21.1

RIBBON COMMUNICATIONS INC.
SUBSIDIARIES OF THE REGISTRANT

Name	Jurisdiction of Incorporation
ECI Telecom Inc.	Delaware
Edgewater Networks, Inc.	Delaware
Laurel Networks Holdings Corporation	Delaware
Network Equipment Technologies, Inc.	Delaware
Ribbon Communications International Inc.	Delaware
Ribbon Communications Federal Inc.	Delaware
Ribbon Communications Operating Company, Inc.	Delaware
Sonus Networks, Inc.	Delaware
GENBAND Inc.	Massachusetts
ECI de Argentina SA	Argentina
Ribbon Communications (Australia) Pty. Ltd.	Australia
Ribbon Communications Belgium SPRL	Belgium
ECI Telecom DO Brazil	Brazil
Ribbon Communications do Brasil Ltda	Brazil
Ribbon Communications Canada ULC	Canada
ECI Telecom Chile Ltda.	Chile
Ribbon Communications Shanghai Co., Ltd.	China
Sonus Networks (Shanghai)	China
Hangzhou ECI Telecommunication Co. Ltd.	China
ECI Telecom Sur America Lta.	Colombia
ECI Telecom Costa Rica S.A.	Costa Rica
Ribbon Communications Czech Republic s.r.o.	Czech Republic
ECI Telecom SAS	France
Ribbon Communications France EURL	France
ECI Telecom (GmbH)	Germany
Ribbon Communications Germany GmbH	Germany
ECI Telecom (HK) Ltd.	Hong Kong
GENBAND Telecommunications (Hong Kong) Ltd.	Hong Kong
Ribbon Communications Hong Kong Limited	Hong Kong
ECI Telecom India Private Limited	India
GENBAND Telecommunications Private Limited	India
Sonus Networks India Private Limited	India
Ribbon Communications International Limited	Ireland
Ribbon Communications Israel Limited	Israel
Enavis Networks Ltd.	Israel
ECI IT Ltd.	Israel
ECI Telecom 2000 Enterprise Ltd.	Israel

Lightscape Networks Ltd.	Israel
Ritbal Ltd.	Israel
ECI - Tadiran Syncoronous System Company (199) Ltd.	Israel
ECI Telecom Group Ltd.	Israel
ECI Telecom Ltd.	Israel
Negev Telecom Lt.	Israel
Inovia Telecom Ltd.	Israel
ECI WaveInno Ltd.	Israel
ECI Telecom - NGTS Ltd.	Israel
Ribbon Communications Italy SRL	Italy
Ribbon Communications K.K.	Japan
ECI Telecom Kenya Limited	Kenya
Ribbon Communications Malaysia Sdn. Bhd.	Malaysia
ECI de Mexico, S.A. de C.V.	Mexico
GENBAND Mexico, S. de R.L. de C.V.	Mexico
Westford Networks Mexico, S. De R.L. de C.V.	Mexico
GENBAND Canada B.V.	Netherlands
ECI Networks Solutions B.V.	Netherlands
ECI Telecom Holdings B.V.	Netherlands
GENBAND Netherlands B.V.	Netherlands
GENBAND NS B.V.	Netherlands
Ribbon Communications B.V.	Netherlands
ECI Telecom (PH), Inc.	Philippines
ECI Telekom Polska sp.z o.o.	Poland
ECI Telecom 2005 LLC	Russia
Ribbon Communications Rus Limited Liability Company	Russia
GENBAND Saudi Arabia Limited	Saudi Arabia
ECI Telecom (HK) Ltd. Singapore Branch	Singapore
Ribbon Communications Singapore Pte. Ltd.	Singapore
Ribbon Communications Spain SRL	Spain
Ribbon Communications Switzerland GmbH	Switzerland
Ribbon Networks Ltd. Co.	Taiwan
ECI Telecom Ukraine LLC	Ukraine
ECI Telecom (UK) Ltd	United Kingdom
N.E.T. Europe Ltd.	United Kingdom
Ribbon Communications UK Limited	United Kingdom
Sonus Networks Limited	United Kingdom

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement Nos. 333- 238888, 333-237224, 333-232946, 333-226624, and 333-221240 on Form S-8 of our reports dated February 26, 2021, relating to the consolidated financial statements of Ribbon Communications Inc. and the effectiveness of Ribbon Communications Inc. and subsidiaries' internal control over financial reporting, appearing in this Annual Report on Form 10-K of Ribbon Communications Inc. for the year ended December 31, 2020.

/s/ Deloitte & Touche LLP

Dallas, Texas
February 26, 2021

EXHIBIT 31.1

CERTIFICATION

I, Bruce McClelland, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ribbon Communications Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 26, 2021

/s/ Bruce McClelland

Bruce McClelland
President and Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATION

I, Miguel A Lopez, certify that:

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

Date: February 26, 2021

/s/ Miguel A. Lopez

Miguel A. Lopez
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 on Form 10-K of Ribbon Communications Inc. (the "Company") for the period ended December 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Bruce McClelland, President and Chief Executive Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 26, 2021

/s/ Bruce McClelland

Bruce McClelland
President and Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 32.2

**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 on Form 10-K of Ribbon Communications Inc. (the "Company") for the period ended December 31, 2020 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Miguel A. Lopez, Chief Financial Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 26, 2021

/s/ Miguel A. Lopez

Miguel A. Lopez
Executive Vice President and Chief Financial Officer (Principal Financial Officer)