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

FORM 10-K

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

For the fiscal year ended December 31, 2019

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

For the transition period from to
Commission File Number 001-38267

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.)

4 Technology Park Drive, Westford, Massachusetts 01886
(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 o No x

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

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No o

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

Indicate by check mark 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 o	Accelerated filer x	Non-accelerated filer o	Smaller reporting company o	Emerging growth company o

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

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

The aggregate market value of the common stock held by non-affiliates of Ribbon Communications Inc. was approximately $286,412,000 based on the closing price for its common stock on The Nasdaq Global Select Market on June 28, 2019. As of February 20, 2020, the Registrant had 111,306,494 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 2020 Annual Meeting of Stockholders are incorporated by reference into Part III of this report.

RIBBON COMMUNICATIONS INC.
FORM 10-K
YEAR ENDED DECEMBER 31, 2019
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Cautionary Note Regarding Forward-Looking Statements

This Annual Report on Form 10-K 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 Annual Report on Form 10-K, including statements regarding our future results of operations and financial position, our pending merger with ECI Telecom Group Ltd., anticipated restructuring and integration-related expenses, 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. Because forward-looking statements relate to the future, they are subject to inherent uncertainties, risks and changes in circumstances that are difficult to predict. These statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. 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 Item 1A., "Risk Factors" of Part I and Items 7 and 7A., "Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Quantitative and Qualitative Disclosures About Market Risk," respectively, of Part II of this Annual Report on Form 10-K. Also, any forward-looking statement made by us in this Annual Report on Form 10-K speaks only as of the date on which this Annual Report on Form 10-K was first filed. Factors or events that could cause our actual results to differ may emerge from time to time, and it is not possible for us to predict all of them. 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.

Presentation of Information

Effective October 27, 2017, we completed the merger (the "Merger") of Sonus Networks, Inc. ("Sonus"), GENBAND Holdings Company, GENBAND, Inc. and GENBAND II, Inc. (collectively, "GENBAND").

Unless the context otherwise requires, references in this Annual Report on Form 10-K to "Ribbon," "Ribbon Communications," "Company," "we," "us" and "our" and "the Company" refer to (i) Sonus Networks, Inc. and its subsidiaries prior to the Merger and (ii) Ribbon Communications Inc. and its subsidiaries upon completion of the Merger, as applicable.

GLOSSARY OF CERTAIN INDUSTRY TERMS

The industry terms defined below are used throughout this Annual Report on Form 10-K for the year ended December 31, 2019 (this “10-K”).

API (*application programming interface*): A set of subroutine definitions, protocols, and tools for building application software. In general terms, it is a set of clearly defined methods of communication between various software components.

Big Data: The use of data analytics and/or predictive analytics to extract value from large data sets. Analysis of large data sets may expose new correlations regarding business trends, infrastructure weaknesses and other related information.

CPaaS (*Communications Platform as a Service*): A cloud-based delivery model that allows organizations to add real-time communication capabilities such as voice, video and messaging to business applications by deploying application program interfaces.

CPU (*central processing unit*): The electronic circuitry within a computer that carries out the instructions of a computer program by performing the basic arithmetic, logical, control and input/output operations specified by the instructions.

Diameter: A next generation industry-standard protocol used to exchange authentication, authorization and accounting information in LTE and IMS networks.

DSC (*diameter signaling controller*): A device that helps communications service providers overcome Diameter signaling performance, scalability and interoperability challenges in LTE and IMS networks.

DSP (*digital signal processing*): The use of digital processing, such as by computers or more specialized digital signal processors, to perform a wide variety of signal processing operations. The signals processed in this manner are a sequence of numbers that represent samples of a continuous variable in a domain such as time, space, or frequency.

Edge: Appliances and/or software implemented on business customer premises that provide communications security and other capabilities for voice and data packet functions.

Edge Routing: Appliances and/or software implemented on business customer premises that provides routing of data packet functions.

GPU (*graphical processing unit*): An advanced electronic circuit designed to rapidly manipulate and alter memory to accelerate the creation of images in a frame buffer intended for output to a display device.

IMS (*IP multimedia [sub]system*): An architectural framework for delivering IP multimedia services.

IP (*Internet Protocol*): A set of rules governing the format of data sent over the Internet or other network.

IP-PBX: SIP-based PBX.

ISP: Internet service provider.

LTE (*long term evolution*): A standard for high-speed wireless communication for mobile devices and data terminals for smooth and efficient transition toward more advanced leading-edge technologies to increase the capacity and speed of wireless data networks. Often used to refer to wireless broadband or mobile network technologies.

MPLS (multiprotocol label switching): A data or packet routing technique in telecommunications networks that directs data from one node to the next based on short path labels rather than long network addresses, thereby avoiding complex lookups in a routing table and speeding traffic flows. MPLS can encapsulate packets of various network protocols, which is the rationale for the "multiprotocol" reference on its name.

MSO (*multi-system operator*): An operator of multiple cable or direct-broadcast satellite television systems.

NFV (*network function virtualization*): A network architecture concept that uses the technologies of IT virtualization to virtualize entire classes of network node functions into building blocks that may connect, or chain together, to create communication services.

OTT (*Over-the-Top*): A media distribution practice that allows a streaming content provider to sell audio, video, and other media services directly to the consumer over the internet via streaming media as a standalone product, bypassing telecommunications, cable or broadcast television service providers that traditionally act as a controller or distributor of such content.

PBX (*private branch exchange*): A telephone system within an enterprise that switches calls between enterprise users on local lines while allowing all users to share a certain number of external phone lines.

PLMN (*public land mobile network*): A network that is established and operated by an administration or by a recognized operating agency for the specific purpose of providing land mobile telecommunications services to the public.

PSTN (*public switched telephone network*): The aggregate of the world's circuit-switched telephone networks that are operated by national, regional, or local telephony operators, providing infrastructure and services for public telecommunication.

RTC (*real-time communications*): A term used to refer to live telecommunications that occur without transmission delays. RTC is nearly instant with minimal latency, data and messages are not stored between transmission and reception and is generally a peer-to-peer interconnectivity, rather than broadcasting or multicasting, transmission.

SBC (*session border controller*): A device regularly deployed in VoIP networks to exert control over the signaling and the media streams involved in setting up, conducting, and tearing down telephone calls or other interactive media communications.

SDK: Software development kit.

SDN (*software-defined networking*): Technology that enables directly programmable network control for applications and network services, decoupling network control and forwarding functions from physical hardware such as routers and switches to create a more manageable and dynamic network infrastructure.

SD-WAN (software-defined - wide area network): SD-WAN is a specific application of software-defined networking (SDN) technology applied to WAN connections such as broadband internet, 4G, LTE or MPLS. It connects enterprise networks including branch offices and data centers over large geographic distances.

Service Provider: A provider of telecommunications services to enterprises and consumers. Service Providers typically own and operate complex telecommunications networks.

SIP (*session initiation protocol*): A communications protocol for signaling and controlling multimedia communication sessions in applications of Internet telephony for voice and video calls, in private IP telephone systems, as well as in instant messaging over IP networks.

SMB: Small-medium business.

SMS (*short message service*): A text messaging service component of most telephone, World Wide Web, and mobile device systems, using standardized communication protocols to enable mobile devices to exchange short text messages.

SOHO: Small office and home office.

STaaS (*SIP Trunking as a Service*): A VoIP technology and streaming media service based on SIP by which Internet telephony service providers deliver telephone services and UC to customers equipped with IP-PBX and UC facilities.

TDM (*time-division multiplexing*): A method of putting multiple data streams in a single signal by separating the signal into many segments, each having a very short duration. Each individual data stream is reassembled at the receiving end based on the timing.

UC (*unified communications*): A business term describing the integration of enterprise communication services such as instant messaging (chat), presence information, voice (including IP telephony), mobility features (including extension mobility and single number reach), audio, web & video conferencing, fixed-mobile convergence, desktop sharing, data sharing (including web connected electronic interactive whiteboards), call control and speech recognition with non-real-time communication services such as unified messaging (integrated voicemail, e-mail, SMS and fax).

UCaaS (unified communications as a service): The provision of business communications and phone system (PBX) services along with collaboration tools such as screen sharing and conferencing via a cloud-based pricing and delivery model.

VAR (*value added reseller*): A company that adds features or services to an existing product, then resells it (usually to end-users) as an integrated product or complete turn-key solution.

VNF (*virtual network function*): Responsible for handling specific network functions that run in one or more virtual machines on top of the appliance networking infrastructure, which can include routers, switches, servers, cloud computing systems and more.

VoIP (*Voice over Internet Protocol*): A methodology and group of technologies for the delivery of voice communications and multimedia sessions over IP networks, such as the Internet.

VoLTE (*Voice over LTE*): A standard for high-speed wireless communication for mobile phones and data terminals over a 4G LTE access network, rather than 2G or 3G connections.

Web-Scale: Historically, the term was associated with the massive cloud architectures developed by Facebook, Google and Amazon. The term has since evolved to reflect a company's adoption of private, efficient and scalable cloud environments that support flexibility, resiliency and on-demand infrastructure.

PART I

Item 1. Business

Overview

We are a leading provider of next generation ("NextGen") software solutions to telecommunications, wireless and cable service providers and enterprises across industry verticals. With over 1,000 customers around the globe, including some of the largest telecommunications service providers and enterprises in the world, we enable service providers and enterprises to modernize their communications networks through software and provide secure RTC solutions to their customers and employees. By securing and enabling reliable and scalable IP networks, we help service providers and enterprises adopt the next generation of software-based virtualized and cloud communications technologies for service providers to drive new, incremental revenue, while protecting their existing revenue streams. Our software solutions provide a secure way for our customers to connect and leverage multivendor, multiprotocol communications systems and applications across their networks and the cloud, around the world and in a rapidly changing ecosystem of IP-enabled devices, such as smartphones and tablets. In addition, our software solutions secure cloud-based delivery of UC solutions - both for service providers transforming to a cloud-based network and for enterprises using cloud-based UC. We sell our software solutions through both direct sales and indirect channels globally, leveraging the assistance of resellers, and we provide ongoing support to our customers through a global services team with experience in design, deployment and maintenance of some of the world's largest software IP networks.

We completed our acquisition of the business and technology assets of Anova Data, Inc. ("Anova"), a private company headquartered in Westford, Massachusetts, that provides advanced analytics solutions, in February 2019 (the "Anova Acquisition"). We believe that the Anova Acquisition reinforces and extends our strategy to expand into network optimization, security and data monetization via big data analytics and machine learning.

We completed our acquisition of Edgewater Networks, Inc. ("Edgewater"), a market leader in Network Edge Orchestration for the distributed enterprise and UC market, in August 2018 (the "Edgewater Acquisition"), making us a software market leader in enterprise Session Border Controllers and allowing us to extend Edgewater software solutions internationally while expanding our cloud offerings and entering the SD-WAN market.

We completed our Merger with GENBAND, a global leader in NextGen software-enabled real-time communications solutions, in October 2017. Because of the Merger, we believe we improved our position to enable network transformations to IP and to cloud-based networks for service providers and enterprise customers worldwide, with a broader and deeper sales footprint, increased ability to invest in growth, more efficient and effective research and development, and a comprehensive RTC product offering.

Industry Background

Traditional TDM-based voice and data solutions are being supplanted by alternative NextGen IP-based networks and RTC software applications are being offered from the cloud in conjunction with the network and enterprise edge. Given this shift, today's telecommunications service providers and enterprises are faced with two separate but related challenges: how to upgrade their aging and costly communications infrastructure, and how to implement new and innovative NextGen software, IP and cloud-based communications capabilities. Service providers in particular must address these challenges while at the same time responding to competition in the form of new web-scale communication providers, such as Microsoft Corp., Google LLC and Amazon.com, Inc.

To address these challenges, service providers and enterprises are modernizing their communications networks, network functions and communications applications from legacy environments to new environments using NextGen IP software, NFV, the cloud and the edge to take advantage of the many benefits that these technologies offer with an end goal of providing better and more productive communications experiences for their customers and employees.

Telecommunications Service Providers: Network Modernization

One of the most significant capital costs for telecommunications service providers has been and continues to be their infrastructure. In order to leverage past capital investments and deliver existing and new services, service providers must consolidate their infrastructure from costly, legacy infrastructures, such as the PSTN and the PLMN, into more efficient and flexible IP- and software-based network models, which are capable of driving revenue growth. Migrating from the PSTN to IP reduces real estate, power and operating costs. IP software networks allow the consolidation of voice, video and data within a single IP-based networking infrastructure over broadband and wireless access and enables new communications services, such as SIP Trunking and Hosted UCs. Similarly, modernizing mobile networks to the IMS-based 4G LTE and VoLTE networks enables mobile service providers to offer better and more efficient mobile communications experiences to end users. As consumers and businesses continue to demand more engaging and productive communications, we believe network modernization is and will continue to be essential to service providers' ability to compete effectively in the market for telecommunications services. As such, key market drivers include:

Modernization of Networks to IP

Communication trends have been shifting for the past several years. What was once an industry built on voice communications from central office switches and PBXs on the enterprise premise is now being replaced by the use of social networks, OTT service providers, mobile applications, and hosted service providers. Consumers are increasingly turning to OTT applications (i.e., WhatsApp, Apple's Facetime and iMessaging, or Amazon's Alexa). This shift has created an enhanced experience for consumers, heightened expectations for future products and services, and expanded related addressable markets.

Network modernization to IP NextGen software-based systems enables service providers to add modern communications service offerings that blend traditional voice messaging capabilities with contemporary features, such as video messaging, visual voicemail, mobile messaging and e-mail integration, and an accelerated time-to-market for differentiated messaging services. Network infrastructures are also undergoing a transformation to IP and the cloud, migrating from hardware-centric appliances to software solutions for voice interconnect and wide area networking.

Enterprises, large and small, are re-architecting business processes and undergoing a digital transformation, building their own virtualized software solutions in the cloud or moving their IT applications entirely to public cloud applications, and adding RTC and collaboration to their customer service solutions. These new offerings improve customer service and create an e-commerce experience that blends online applications with the in-store environment, creating a seamless experience for customers.

As a result of these evolving communications environments, the complexity of network operations is also increasing significantly, requiring sophisticated NextGen software solutions based on machine learning and analytics to provide reliable network operations.

Secure Real-time Communications

The evolution by telecommunications service providers to IP NextGen software-based RTC exposes them to new security threats, as the "walled" protection offered by their voice network infrastructures no longer exists with SIP and data-based networks. With SIP-based systems, RTC applications such as voice, video and messaging become data applications, and without appropriate security measures in place, these networks are left open to security breaches and hacks. Additionally, the move to SIP has seen an increase in fraud in service provider networks in the form of robo-dialing and toll fraud schemes.

Given these threats, there is a need for sophisticated software security solutions to protect IP-based communications networks. Service providers have relied upon the software capabilities of SBCs, which are deployed within their networks and are designed to provide robust security as well as simplify interoperability, routing and other functions as a protection measure. By its nature, the SBC controlling software is application-aware and therefore can provide sophisticated data to software-based analytics platforms to detect and thwart security breaches. In conjunction with SBCs, big data analytics and machine learning solutions can enforce a network-wide security perimeter. We believe securing networks against threats is most effective when secure software solutions are deployed within networks into existing RTC investments and combined with network-wide approaches for secure RTC.

Edge Orchestration

As service providers deliver hosted and cloud UC services to enterprises, they need to be able to provide those services to the enterprise via the internet and IP infrastructure and must do so with service assurance, security and reliability in a cost-effective manner. Hybrid cloud and edge orchestration software offerings enable service providers to manage enterprise edge devices remotely from their cloud or network and provide the service in a cost-effective and reliable manner. Such solutions minimize service downtime and expensive visits to enterprise customer sites via truck rolls to work on the edge devices on the enterprise customer premise.

Network Function Virtualization

In addition to shifting from traditional TDM-based voice and data networks to secure IP NextGen software networks, telecommunications service providers are increasingly moving toward NFV in order to offer new services quickly to their customers, reduce costs and compete with Web-Scale companies. NFV provides a new way to design, deploy and manage networking services by decoupling network software functions from proprietary appliances so they may run in software. This transformation enables better use of network infrastructure, creates agility, delivers rapid and elastic scaling, and enables faster time to market. Software-enabled VNFs can be deployed on generic computing platforms, hosted in private and public clouds, located in data centers, within other network elements or on computer platforms on end user premises.

Cloud and “as a Service” Models

As software communications applications are deployed in the cloud, telecommunications service providers gain the ability to offer a new class of business models commonly referred to “as a Service” solutions, including CPaaS, UCaaS and STaaS, all of which have the capability to disrupt traditional Service Provider models.

Enterprises: Network Modernization and Digital Transformation

Today’s enterprises, including multi-national corporations, SMBs and government institutions, are undergoing not only a network modernization but also a digital business transformation. The focus is shifting from person-to-person communications to contextual collaboration and omni-channel customer experiences. Within this context, enterprises need a secure, scalable and innovative NextGen software alternative to proprietary PBX and UC products. As part of their digital transformation, enterprises have adopted the cloud, open interfaces, mobile, Big Data, and analytics. Seeing the advantages and cost savings from the cloud, enterprises are migrating their communications solutions to this same environment, thereby enabling connections between business processes, communications, and collaboration.

Network Modernization

Enterprises undergoing network modernization are focused on moving from TDM-based PBXs to SIP trunking and NextGen UC software and collaboration systems while ensuring interoperability during the transformation process. In addition, enterprises in certain industries will often be subject to specific requirements or standards before a network transformation is completed. For example, governments may require Joint Interoperability Test Command ("JITC") certification for secure deployments, and healthcare providers may need to achieve Health Insurance Portability and Accountability Act ("HIPAA") certification.

When modernizing a network with software, the ability to interwork modern applications, such as Microsoft’s Skype for Business and Teams, with legacy analog endpoints on premises becomes essential. Additionally, software capabilities of SBCs are vital in providing interworking and survivability options. SBCs play a crucial role in securing the modern network and for NextGen UC software, which is a top priority for any enterprise. Edge SBC software devices can also play an important role in providing SD-WAN and Edge Routing capabilities for small and distributed enterprises. Due to the growing open nature of communications environments in the enterprise, the complexity of network operations is also increasing significantly, requiring sophisticated software solutions based on machine learning and analytics to provide reliable network operations.

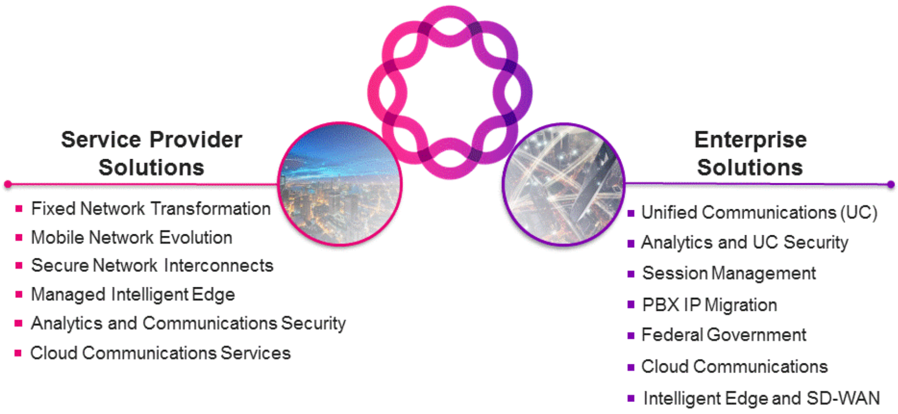
Digital Transformation

Successful enterprises today are focused on innovating their core product offerings and building a strategic advantage to reach and empower their customers. As technologies evolve and new mobile applications and connected devices proliferate, enterprises must adapt and innovate their communications solutions to create a “connected” experience anywhere, anytime, on any device. As part of this process, businesses are increasingly deploying “as a Service” offerings from the cloud (from either a service provider or a web-scale provider). UCaaS and CPaaS create a single software communications platform that changes the way enterprises deliver services and interact with customers. CPaaS software enables enterprises to quickly build applications that tie real time communications and their social channels to their business processes while UCaaS software delivers the underlying UC capabilities to ensure end users have the features and functionality required to enable reliable and scalable end-to-end communications.

Our Solutions, Products and Services

Ribbon Solutions

Ribbon provides secure NextGen RTC software-enabled appliances and cloud solutions for service providers and enterprises. Ribbon's software communications solutions are widely deployed at over 1,000 customers globally; provide high scale, reliability and performance; and are deployable from the public, private and hybrid cloud, in-network or on the enterprise premise and edge. As of December 31, 2019, our software solutions, which are a combination of our software products and services, for service providers and enterprises included the following:



Ribbon service provider software solutions enable fixed and wireless service providers, cable providers (or MSOs), ISPs and interconnect service providers to modernize their networks, quickly capitalize on growing market segments and introduce differentiating products, applications and services for their business and consumer customers. Ribbon's service provider software solutions include fixed network transformation, wireless network evolution (mobility), secure network interconnects, managed intelligent edge services, cloud communications as a service, and communications analytics and security solutions, enabling secure and innovative business and consumer communications services offerings. Ribbon software solutions help service providers connect people to each other wherever they happen to be, addressing the growing demands of today's businesses and consumers for secure RTC.

Ribbon's enterprise software solutions allow enterprises to securely connect to SIP trunks and modernize their unified and cloud communications networks. Modernization solutions range from Intelligent Edge, legacy Nortel PBX evolution, securing UC and contact centers, migrating to Microsoft Skype for Business and Teams with Direct Routing, and providing session management, security and cloud communications software solutions to enable highly productive communications experiences for employees and customers using the web, mobile and fixed endpoints. Ribbon provides secure communications software solutions for the federal government vertical and has JITC certified solutions. Ribbon also provides RTC software solutions to other industry verticals, including higher education, finance and healthcare. Ribbon has significant experience and expertise in securing SIP communications with a portfolio of SBC software solutions and has deployed thousands of SBC software installations across different industry verticals. Our Intelligent Edge software solutions secure and simplify UC deployments and enable SD-WAN and Edge Routing for small and distributed enterprises. Our Microsoft Skype for Business and Teams software solutions secure those communications environments and assist in the migration of enterprise customers to those environments. Our analytics solutions provide better network visibility, security and customer behavior insights.

Ribbon Products

Ribbon software products enable service providers to take new services to market quickly and with scale and carrier class reliability, allowing such providers to compete effectively in the marketplace, and enable enterprises to make their employee and customer engagement experiences richer and more productive.

Ribbon's software product lines enabling network transformation, mobile network evolution and interconnect solutions include

Ribbon's call session controllers, media gateways, signaling, policy and routing software and a market leading portfolio of SBCs intelligent edge software products, all of which are mechanisms through which operators and enterprises deploy our secure RTC software solutions. Ribbon’s NextGen UC software solutions are enabled by the Ribbon Application Server, Client and Intelligent Messaging products, and are a software platform for business and residential multimedia communications across fixed, mobile, cable, and enterprise markets. Our software product portfolio facilitates the securing of SIP-based UC sessions in the enterprise core and edge networks, and the migration of legacy PBX-based enterprise communications networks (such as the Nortel PBX installed base) across different market verticals. Our software product portfolio includes element management and network management software to enable customers to configure, monitor and manage the solutions they purchase from us.

The software product portfolio also includes native mobile client products that allow service providers to enable Wi-Fi and LTE calling services for their subscribers without the considerable cost of investing in, implementing and maintaining, a full VoLTE IMS network.

The Ribbon Analytics portfolio consists of Operations, Security and Monetization applications for services assurance, security and subscriber growth. With our big data Protect analytics platform and pre-packaged features, we provide detailed insights into network, service traffic and customer behavior.

The Company's Cloud Communications “as a Service” portfolio, which includes CPaaS, UCaaS and STaaS offerings, is based on Kandy Cloud, which is a cloud-based RTC software platform that enables service providers, independent software vendors, systems integrators and enterprises to rapidly create and deploy high value embedded communications services for their customers. Utilizing Ribbon's communications technology, which is offered as a part of a white-label solution service, service providers may connect their networks to Kandy Cloud CPaaS via SIP trunks and APIs. The Kandy Cloud software platform provides APIs and SDKs for developers to build embedded communications applications. Kandy Cloud helps service providers grow revenue with quick to deploy, pre-packaged applications called Kandy Wrappers. Kandy Wrappers are fully functional software applications that can be delivered standalone or inserted into an enterprise website or into an enterprise application to endow it with embedded RTC capabilities. Kandy Cloud also delivers a suite of UCaaS solutions, such as Cloud PBX, Cloud Contact Center and Cloud Collaboration.

Ribbon Global Services

Our global services organization is responsible for all aspects of implementation and support of our solutions and products. Key portfolio components include solution and business consulting, system integration, deployment, and managed care services. Our technical support group provides constant support to keep customers' software operating at peak performance. Support services include managing software updates, appliance maintenance, appliance spare services and managed spares programs, and emergency assistance during disaster recovery.

With a local presence in over twenty countries on five continents, Ribbon Global Services provides both a U.S. presence and a global presence with complete coverage to help drive our customers’ success.

The Ribbon Global Services team provides our customers with the following:

A full-service portfolio including deployment and integration, testing and verification, migration, operational support, monitoring and managed services;

End-to-end project management and accountability via highly experienced program managers who follow a consistent, disciplined methodology;

Knowledgeable and experienced technical resources with in-depth skills and expertise on IP communications software solutions and network modernization;

Consistent execution in the design, deployment and support of the world's largest and most advanced software networks; and

Award winning, around-the-clock technical support services with dedicated technical support centers around the globe, including the United States, Canada, Mexico, United Kingdom, Spain, Germany, Czech Republic, Australia, Japan, Malaysia, Taiwan, China (Hong Kong) and India.

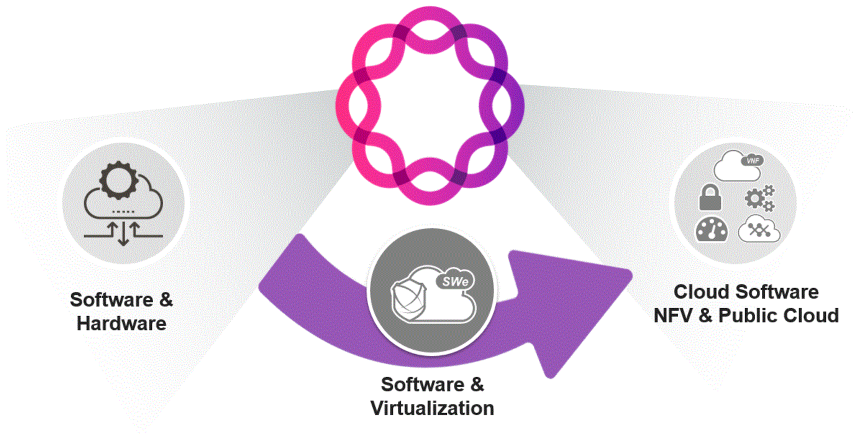
Our Strategy

Ribbon is a leader in enabling network modernization through NextGen software and we plan to continue to invest in our software solutions platform approach to increase our global reach and scale. We aim to enable service providers and enterprises to significantly expand their software-enabled RTC environments to provide better, more agile end customer experiences that contain their operational and capital expenditure costs. By doing so, we believe we will sustain our industry-leading position and succeed in our market. Our customers are key to the success of our business and our business model is focused on aligning with our customers through direct engagement, service and support as well as through our channel partners. This model allows us to target our sales and research and software development efforts based on the needs of our customers and we believe it is critical to our success.

Key elements of Ribbon's strategy include:

Selectively Invest in our Core Software Products and Solutions. In order to service our customers and support their key priorities and growth, we must strategically invest in research and development. We are committed to balancing our research and software development investments between existing software products and solutions and new growth-oriented product initiatives. During 2019, we continued to shift our investment efforts, resulting in greater than 95% of our research and development investment directed at software. In addition, we are focused on investing in products and solutions that will be profitable. We intend to continue to sunset certain less significant product offerings that are not aligned with our strategic direction and are not meaningful contributors to our profitability. We believe this will allow us to more effectively and efficiently deploy capital to our growth areas. Through targeted research and software development investments in core software products and solutions that will align with our strategy for growth, we are committed to helping our customers migrate their networks to software and virtualized and private or public cloud environments.

Build on Growing our Customer Footprint and Global Reach. Ribbon has over 1,000 customers globally, in all of the major regions with many of the largest telecommunications service providers and enterprises in the world. This footprint allows us to sell additional software products and services from the Ribbon portfolio to that deployed base of existing customers and provides us with the opportunity to sell new software products and services to that customer base. We also continue to look for opportunities to expand our portfolio footprint and global reach to further diversify our customer base.



Disciplined Expansion into New Markets and New Solutions for Growth. We believe that a disciplined approach to targeting new markets is critical to growing our business. As such, we have taken actions to expand our software portfolio and offerings to our customers. We have expanded our investments in the enterprise market and have increased our revenue from enterprise customers. We are investing in growth initiatives focused on cloud communications and RTC security both for service providers and enterprises. Similarly, given our significant experience with securing IP network borders in the core and the edge with our SBC software, and the increasing importance of security in today's networks and communications, we are working on expanding our role in securing RTC with new software portfolio offerings.

Selectively Pursue Strategic Relationships, Alliances and Acquisitions. The ecosystem in which we operate is continually evolving and expanding. Accordingly, we continue to pursue strategic relationships, alliances and acquisitions that align our business with our customers' strategic goals and objectives as well as our own strategic goals for further extending our footprint, reach, scale and growth in the business.

Competitive Differentiation

In addition to our scale and global presence, we believe there are several factors that set us apart and allow us to compete effectively with comparable peers in terms of scope, size and scale.

Installed Base. Ribbon has a large, global deployed base from our Nortel-, Sonus- and GENBAND-heritage-branded software products, including softswitches and media gateways in global service provider and enterprise networks supporting over 30 million switched access lines. These products are highly integrated into our customers' network environments and require specialized tools and intellectual property from Ribbon to consolidate and modernize those environments to newer IP software-based services with optimal capital expenditure investments. Similarly, our large, global deployed base of SBCs at service providers' networks and in enterprises offers Ribbon a unique platform for upgrading and cross-selling software products into that installed base.

Strong Technology in Virtualization. Ribbon has extensive network virtualization software products and technology as part of our overall portfolio and has deployed these pure software products to help our customers in the modernization of their networks to software-based virtualization, enabling the use of the private or public cloud. We believe we are the clear market leader in SBC virtualized software products, and a significant portion of our overall portfolio has software and virtualized offerings that can co-exist with appliance-based software products.

Security Experience and Technology. Our SBC and edge software, deployments and expertise are market leading. Ribbon has been in the SBC software market for over fifteen years, yielding us a strong advantage from which to launch additional security offerings into the market. We believe our SBC software products are unmatched in the market on reliability, performance and functionality at scale.

Media Processing, Transcoding and Signaling Technology Expertise. We have extensive experience in deploying mobile VoLTE and fixed network software solutions. Our voice media transcoding software technology that is supported by CPU, GPU or DSP options is industry leading. Our mobile network evolution software solutions are deployed in large-scale 4G VoLTE networks supporting over 350 million subscribers in total.

Intellectual Property

Intellectual property is fundamental to our business and our success, and we depend upon our ability to develop, maintain and protect our technology. We have defended, and intend to vigorously defend when necessary, our intellectual property from infringement. Therefore, we seek to safeguard our investments in technology and rely on a combination of United States and foreign patent, trademark, trade secret and copyright law and contractual restrictions to protect the proprietary aspects of our technology and to defend us against claims from others. Our general policy has been to seek to patent those patentable inventions that we plan to incorporate in our products or that we expect will be valuable otherwise. We have a program to file applications for and obtain patents, copyrights and trademarks in the United States and in specific foreign countries where we believe filing for such protection is appropriate.

As of December 31, 2019, we held patents and had pending patent applications both in the United States and abroad as follows: in the name of Ribbon Communications Operating Company, Inc., 248 United States patents with expiration dates ranging from February 2020 through December 2037, 31 patent applications pending in the United States, 50 foreign patents with expiration dates ranging from May 2020 through April 2030, and eight patent applications pending abroad; in the name of GENBAND US LLC, 325 United States patents with expiration dates ranging from February 2020 through October 2037, 59 patent applications pending in the United States, 229 foreign patents with expiration dates ranging from January 2020 through July 2035 and 50 patent applications pending abroad; in the name of Ribbon Communications Securities Corp., 27 United States patents with expiration dates ranging from November 2028 through March 2034, two patent applications pending in the United States and two foreign patent applications pending abroad; and in the name of Edgewater Networks, Inc., six United States patents with expiration dates ranging from October 2022 through March 2035 and six patent applications pending in the United States.

Furthermore, as of December 31, 2019, we had 41 registered trademarks in the United States, as follows: 15 in the name of GENBAND US LLC, including GENBAND, GENBAND with design, G9, G9 with design, KANDY and BUSINESSCALL; 16 in the name of Ribbon Communications Operating Company, Inc., including SONUS, the SONUS logo, RIBBON, the Ribbon logo, RIBBON PROTECT and NETSCORE; one in the name of Network Equipment Technologies, Inc., for

PROMINA; four in the name of Quintum Technologies, LLC, including TENOR; four in the name of Ribbon Communications Securities Corp.; and five in the name of Edgewater Networks, Inc., including Edgewater and Edgeview. We also had one pending trademark application in the United States in the name of Ribbon Communications Operating Company, Inc., for RIBBON PROTECT, as of December 31, 2019.

In December 2019, Ribbon Communications Securities Corp. changed its name to GENBAND Inc., GENBAND US LLC merged with and into Ribbon Communications Operating Company, Inc., and Quintum Technologies, LLC was dissolved. We either plan to or are in the process of recording (i) the name change from Ribbon Communications Securities Corp. to GENBAND Inc.; (ii) the assignment of patents and copyrights from GENBAND US LLC to Ribbon Communications Operating Company, Inc.; and (iii) the assignment of patents and copyrights from Quintum Technologies, LLC to Ribbon Communications Operating Company, Inc.

In addition to the protections described above, we seek to safeguard our intellectual property by:

Employing measures to safeguard against the unauthorized use or disclosure of the source and object code for our software, documentation and other written materials, and seeking protection of such materials under copyright and trade secret laws;

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 current products. From time to time, we may be required to license additional technology from third parties to develop new products or to enhance existing products. Based on experience and standard industry practice, we believe that licenses to use third-party technology generally can be obtained on commercially reasonable terms. Nonetheless, there can be no assurance that necessary third-party licenses will be available or continue to be available to us on commercially reasonable terms. As a result, the inability to maintain, license or re-license any third-party licenses required in our current products, or to obtain any new third-party licenses to develop new products and enhance existing products could require us to obtain substitute technology of lower quality or performance standards or at greater cost. This could delay or prevent us from making these products or enhancements, any of which could seriously harm our business, financial condition and operating results.

Please see generally the risks that are discussed in Item 1A. “Risk Factors” for risks related to our intellectual property.

Our Customers

We have over 1,000 customers globally. Our customers are located around the world in over 50 countries and include many of the leading global telecommunications service providers and enterprises. We have continually served many of our largest customers for well over 30 years. Service providers use our products to provide secure software-enabled RTC for the service providers (in the case of interconnects), enterprises and consumers they serve. Enterprises use our products to provide software-enabled RTC for their employees (including remote workers) as well as provide secure communications networks for their customer-facing components, such as contact centers.

Our global service provider customers include fixed-line, wireless, cable, internet and interconnect service providers. Our enterprise customers include businesses of all sizes, ranging from SOHO, SMB, and large and distributed enterprises across various industry verticals with a concentration in the federal government, healthcare and education sectors. We sell to customers via a direct sales team as well as through indirect channels that include VARs, system integrators and service providers. Independent software vendors also partner with Ribbon to source our software solutions and market them through their sales channels.

In the year ended December 31, 2019, Verizon Communications Inc. ("Verizon") and AT&T Inc. ("AT&T") accounted for approximately 17% and 12% of our revenue, respectively. In both the years ended December 31, 2018 and 2017, approximately 17% of our revenue was derived from sales to Verizon. Both Verizon and AT&T are service providers that offer interconnect, fixed line and mobile communications services. For both Verizon and AT&T, our software solutions are sold across their respective business divisions supporting their large enterprises, SMB and consumer telecommunications and cable-related offerings. Our top five customers represented approximately 40% of our revenue in the year ended December 31, 2019, 38% of our revenue in the year ended December 31, 2018 and approximately 41% of our revenue in the year ended December 31, 2017.

Competitive Conditions

Competition in the telecommunications market remains fierce. The market is shifting from a market dominated by a few large telecommunications legacy hardware equipment companies, such as Ericsson LM Telephone Company, Huawei Technologies Co. Ltd., and Nokia Corporation, to a market that is characterized by software, including 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, including:

Network transformation: Mid-size vendors of networking and telecommunications equipment and specialty vendors, including AudioCodes Ltd., Mavenir Systems, Inc., Metaswitch Networks Corporation, Oracle Corporation (Session Border Controller) and ADTRAN, Inc.;

Enterprise and cloud solutions: Microsoft, 8x8, Inc., Avaya Inc., Bandwidth Inc., Cisco Inc. (with Broadsoft, Inc.), Mitel Networks Corporation (with ShoreTel, Inc.), Plivo Inc., RingCentral, Inc., Twilio Inc., Telestax Inc., Fuze, Inc., Genesys and Vonage Holdings Corp. (with Nexmo, Inc. and Tokbox Inc.); and

Security and analytics: SecureLogix Corporation, RedShift Networks Corporation, Empirix Inc. and Oracle Corporation.

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, as these reduce the number of customers and channels for products and solutions.

To compete effectively, we must deliver innovative software solutions 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.

Although we believe we compete favorably because our software solutions are widely deployed, highly scalable and cost-effective for our customers, some of our competitors include products in their portfolios that we do not provide and may be able to devote greater resources to the development, promotion, sale and support of their products. In addition, some of our competitors have more extensive customer bases and broader customer relationships than we have, including relationships with our potential customers and established relationships with distribution partners.

Please see generally the risks that are discussed in Item 1A, "Risk Factors" for risks related to our customers and the competitive landscape in which we operate.

Sales and Marketing

We sell our software products, solutions and services to our customers with a direct internal sales force and also indirectly via channels and partnerships globally, leveraging the assistance of service provider channels and VARs such as Verizon Communications Inc. and distributors such as Westcon Group Inc., Ingram Micro Inc., BlackBox Corporation and Arrow S3. Our channel partner programs are designed to serve particular markets and provide our customers with opportunities to purchase our products in combination with related services and products. For example, Ribbon is a Microsoft Gold Communications Partner and helps enterprises optimize Skype for Business and Teams deployments by securing those communications.

As a primary supplier of software solutions to Tier 1 service providers (a service provider that can reach every other network on the Internet without purchasing IP transit), we require a strong worldwide presence. We have an established sales presence throughout North America, Europe, Asia/Pacific, the Middle East, Africa and Central/South America. We also have a dedicated direct sales team focused on the enterprise, industry verticals and federal government sector in the United States.

Our marketing team is focused on promoting company brand awareness, increasing our software solutions, product, technology and services differentiation and awareness via webinars, company web sites, advertising and digital outreach, as well as generating qualified sales leads. We promote thought leadership on technology and our solutions within the industry by participating in and speaking at industry events and conferences and via social network campaigns and blogs. Our marketing team also provides briefings to industry analysts on a regular basis and at major industry events, communicates with the media in connection with noteworthy public announcements.

Please see generally the risks that are discussed in Item 1A. "Risk Factors" for risks related to our sales strategy.

Manufacturing

A number of our software products are deployed on appliances. Where our products contain an appliance element, we utilize contract manufacturers to source and assemble these components. Our contract manufacturers provide comprehensive manufacturing services, including assembly and testing of our products and procurement of component materials on our behalf. We believe that outsourcing the manufacturing of any necessary appliance enables us to preserve working capital, allows for greater flexibility in meeting changes in demand and enables us to be more responsive in delivering diverse product offerings to our customers. As of December 31, 2019, we outsourced the manufacturing of our appliance products to four manufacturers, two upon which we primarily rely. We and our contract manufacturers purchase several key components of our appliance products, including commercial digital signal processors, from single or limited sources. We purchase these components on a purchase order basis.

Our purchases of direct materials and components for manufacture were approximately $70 million in 2019 and $75 million in 2018. Going forward, we expect our overall trend of a reduction in direct material purchases to continue as the software richness within our products increases while the remaining appliance content declines.

Please see generally the risks that are discussed in Item 1A. “Risk Factors” for risks related to our manufacturing operations and use of contract manufacturers.

Research and Development

We believe that strong software product development capabilities are essential to our strategy of enhancing our core technology, developing additional security and network modernization features and maintaining comprehensive software and service offerings. Our research and development process leverages innovative technology in response to market data and customer feedback. As part of this process, we regularly review research and software development investments in our products and balance them against market demand.

We have assembled a team of highly skilled engineers with significant transcoding, UC application and networking industry experience. Our engineers have deep experience in software design and development. Our engineering effort is focused on Edge, NextGen UC, NFV, security and cloud-based architecture software product development.

As of December 31, 2019, we maintained research and development offices in the United States, Canada, India and the United Kingdom.

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 finalizing their annual budgets, 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.

Backlog

We sell products and services pursuant to purchase orders issued under master agreements that provide standard terms and conditions that govern the general commercial terms and conditions of the sale. These agreements typically do not obligate customers to purchase any minimum or guaranteed quantities, nor do they generally require upfront cash deposits. At any given time, we have orders for products that have not yet been shipped and for services (including our customer support obligations) that have not yet been performed. We also have orders relating to products that have been delivered and services that have been performed but have not yet been accepted by the customer under the applicable purchase terms. We include both of these situations in our calculation of backlog.

A backlogged order may not result in revenue in the quarter in which it was booked, and the actual revenue recognized in a quarter may not equal the total amount of related backlog. In addition, although we believe that the backlog orders are firm, purchase orders may be canceled by the customer prior to shipment without significant penalty. Therefore, we do not believe that our backlog, as of any particular date, is necessarily indicative of actual revenue for any future period.

We have begun to derive, and expect to continue to derive, a greater percentage of our revenue from the enterprise market and through sales channels where speed of fulfillment is essential to winning business. Consequently, we expect to earn a lower relative percentage of our total business from large service provider orders that are delivered over multiple quarters and years and that our backlog going forward will diminish both as a comparable metric to prior periods and as a relative percentage of total revenue (both service provider and enterprise). Our backlog was approximately $323 million at December 31, 2019 and approximately $340 million at December 31, 2018.

Our Employees

At December 31, 2019, we had a total of 2,209 employees, comprised of 1,289 employees located in the Americas, 234 employees located in the Middle East, Africa and Europe and 686 employees located in the Asia Pacific region. Certain of our employees are represented by collective bargaining agreements, primarily in Europe. We believe our relationships with our employees are good.

Segment Information

We operate in a single segment. Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision maker in making decisions regarding resource allocation and assessing performance. To date, our chief operating decision maker has made such decisions and assessed performance at the company level, as one segment. Our current chief operating decision makers are our Interim Co-Presidents and Chief Executive Officers.

Pending Merger

On November 14, 2019, we entered into an Agreement and Plan Merger (the "ECI Merger Agreement") with Eclipse Communications Ltd., an indirect wholly-owned subsidiary of the Company ("Merger Sub"), Ribbon Communications Israel Ltd., ECI Telecom Group Ltd. ("ECI") and ECI Holding (Hungary) kft, pursuant to which Merger Sub will merge with and into ECI, with ECI surviving such merger as a wholly-owned subsidiary of the Company (the "ECI Merger").

Our Board of Directors (the "Board") unanimously approved the ECI Merger Agreement and the transactions contemplated thereby. We held a stockholder meeting on January 27, 2020 (the “Special Meeting”), at which stockholders approved an issuance of 32.5 million shares of our common stock (the “ECI Stock Consideration”) as partial consideration in the ECI Merger.

As provided in the ECI Merger Agreement, at the time of the closing, all equity securities of ECI issued and outstanding immediately prior to the closing will be converted into the right to receive consideration consisting of $324 million in cash (the "ECI Cash Consideration") and the ECI Stock Consideration, less the amount of indebtedness of ECI. ECI equityholders will also receive approximately $31 million from ECI's sale of real estate assets. We intend to fund the ECI Cash Consideration with proceeds from a new $500 million credit facility that we expect to enter into with Citizens Bank, N.A. and Santander Bank, N.A., as joint lead arrangers and bookrunners, in connection with the closing of the ECI Merger (the “2020 Credit Facility”). The 2020 Credit Facility consists of a $400 million term loan, which will be used in part to fund the merger, and a $100 million revolver that is projected to be undrawn at closing. The 2020 Credit Facility will retire our existing credit facility. Immediately following the closing, it is expected that the former holders of ECI will own approximately 23% of our outstanding common shares. The ECI Merger is expected to close in the first quarter of 2020, subject to regulatory approvals and customary closing conditions.

Our Company History

We were organized as a Delaware corporation on May 19, 2017, initially under the name Solstice Sapphire Investments, Inc., for the purpose of effecting the merger of Sonus and GENBAND. The Merger occurred on October 27, 2017. Upon completion of the Merger, Sonus and GENBAND became wholly-owned subsidiaries of Solstice Sapphire Investments, Inc., which concurrently changed its name to Sonus Networks, Inc. On November 28, 2017, Sonus Networks, Inc. changed its name to Ribbon Communications Inc. Ribbon succeeded to and continues to operate, directly or indirectly, the then existing businesses of Sonus and GENBAND.

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 the Proposed ECI Telecom Group Ltd. Merger

Completion of the pending ECI Merger is subject to conditions and may not be consummated on the terms or timeline currently contemplated, if at all.

On November 14, 2019, we entered into the ECI Merger Agreement with ECI and ECI Holding (Hungary) kft, among others, pursuant to which Merger Sub will merge with and into ECI, with ECI surviving such merger as a wholly-owned subsidiary of Ribbon. Our obligations to complete the ECI Merger are subject to the satisfaction or waiver of certain conditions, including (i) the approval of the ECI Merger by ECI's shareholders and the approval of the issuance of our common stock as partial consideration in the ECI Merger by our stockholders, (ii) the receipt of all required antitrust and foreign investment approvals and clearances, and (iii) the absence of any injunctions being entered into or law being adopted that would make the ECI Merger illegal.

The failure to satisfy all of the required conditions could delay the completion of the ECI Merger by a significant period of time or prevent the ECI Merger from occurring. Any delay in completing the ECI Merger could cause us to not realize some or all of the benefits that we expect to achieve if the ECI Merger is successfully completed within the expected time frame, cause us to incur unexpected costs, and adversely impact our business.

We have incurred, and will continue to incur, significant costs, expenses and fees for professional services and other transaction costs in connection with the proposed ECI Merger, and these fees and costs are payable by us regardless of whether the ECI Merger is consummated. Management has also spent significant time and resources working on the ECI Merger. If the ECI Merger Agreement is terminated under certain circumstances specified in the ECI Merger Agreement, we may be required to pay ECI a termination fee of $19,500,000 if all conditions to the ECI Merger are satisfied and the Company fails to consummate the ECI Merger due to a failure to obtain debt financing to support payment of the cash portion of the ECI Merger consideration. Additionally, we may be required to pay ECI a termination fee of $13,625,000 and expense reimbursement up to $2,275,000 if ECI terminates the ECI Merger Agreement due to a change in the recommendation of, or failure to affirm the recommendation by, our Board of Directors or following the termination of the ECI Merger Agreement in certain circumstances if we enter into a definitive agreement in respect of another acquisition proposal (or consummate such a transaction).

Although our stockholders have approved the Share Issuance, the equityholders of ECI have approved the ECI Merger and the U.S. Federal Trade Commission granted early termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, there can be no assurance that the other conditions to closing the ECI Merger will be satisfied or waived, including one outstanding regulatory approval. For these and other reasons, the ECI Merger may not be completed on the terms or timeline contemplated, if at all.

Combining Ribbon and ECI may be more difficult, costly or time-consuming than expected and the anticipated benefits and cost savings of the pending ECI Merger may not be realized.

We are operating and, until the completion of the ECI Merger, will continue to operate independently of ECI. The success of the ECI Merger, 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 pendency of the ECI Merger and/or 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 Merger.

We have incurred and will incur additional transaction fees, including legal, regulatory and other costs associated with closing the transaction, 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 Merger and the integration of the two companies' businesses. 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 Merger may not be realized fully or at all, or may take longer to realize than anticipated. The actual cost savings of the ECI Merger could be less than expected.

The announcement and pendency of the ECI Merger may adversely affect our business, financial condition and results of operations.

Uncertainty about the effect of the pending ECI Merger on our employees, clients, and other parties may have an adverse effect on our business, financial condition and results of operation regardless of whether the ECI Merger is completed. These risks to our business include the following, all of which may be exacerbated by a delay in the completion of the ECI Merger: (i) the impairment of our ability to attract, retain, and motivate our employees, including key personnel; (ii) the diversion of significant management time and resources from day-to-day operations towards the completion of the pending ECI Merger; (iii) difficulties maintaining relationships with clients, suppliers, and other business partners; (iv) delays or deferments of certain business decisions by our clients, suppliers, and other business partners; (v) the inability to pursue alternative business opportunities, engage in certain financing transactions or make appropriate changes to our business; (vi) litigation relating to the pending ECI Merger and the costs related thereto; and (vii) the incurrence of significant costs, expenses, and fees for professional services and other transaction costs in connection with the pending ECI Merger.

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. The primary factors that may affect our revenue and operating results include, but are not limited to, the following:

- consolidation within the telecommunications industry, including acquisitions of or by our customers;
- general economic conditions in our markets, both domestic and international, as well as the level of discretionary IT spending;
- competitive conditions in our markets, including the effects of new entrants, consolidation, technological innovation and substantial price discounting;
- fluctuation in demand for our products and services, and the timing and size of customer orders;
- fluctuations in foreign exchange rates;
- cancellation or deferral of existing customer orders or the renegotiation of existing contractual commitments;
- mix of product configurations sold;
- length and variability of the sales cycle for our products;
- application of complex revenue recognition accounting rules to our customer arrangements;
- timing of revenue recognition;
- changes in our pricing policies, the pricing policies of our competitors and the prices of the components of our products;
- market acceptance of new products, product enhancements and services that we offer;
- the quality and level of our execution of our business strategy and operating plan, and the effectiveness of our sales and marketing programs;

- new product announcements, introductions and enhancements by us or our competitors, which could result in deferrals of customer orders;
- our ability to develop, introduce, ship and successfully deliver new products and product enhancements that meet customer requirements in a timely manner;
- our reliance on contract manufacturers for the production and shipment of our appliance products;
- our or our contract manufacturers' ability to obtain sufficient supplies of sole or limited source components or materials;
- our ability to attain and maintain production volumes and quality levels for our products;
- variability and unpredictability in the rate of growth in the markets in which we compete;
- costs related to mergers, acquisitions and divestitures; and
- corporate restructurings.

Equipment purchases by communications service providers 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.

We have incurred net losses and may incur additional net losses.

We incurred net losses in fiscal years 2019, 2018 and 2017. We may incur additional net losses in future quarters and years. Our revenue may not grow, and we may never generate sufficient revenue to sustain profitability. Any failure by us to achieve, sustain or increase profitability on a consistent basis could cause the value of our common stock to decline.

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 a market 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, including:

- Within the network transformation space, mid-size vendors of networking and telecommunications equipment and specialty vendors, including AudioCodes Ltd., Dialogic Inc., Mavenir Systems, Inc., Metaswitch Networks Ltd., Oracle Corporation (Session Border Controller), and ADTRAN, Inc.;
- Within the enterprise and cloud solutions space, 8x8, Inc., Avaya Inc., Bandwidth Inc., Cisco Inc. (with Broadsoft, Inc.), Mitel Networks Corporation (with ShoreTel, Inc.), Plivo Inc., RingCentral, Inc., Twilio Inc., Telestax Inc., Fuze, Inc., Genesys and Vonage Holdings Corp. (with Nexmo, Inc. and Tokbox Inc.); and
- Within the audio and video security and analytics space, SecureLogix Corporation, RedShift Networks Corporation, Empirix Inc. and Oracle Corporation.

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.

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.

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.

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.

We will not be successful if we do not grow our customer base or if we are unable to generate recurring business 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 17% of our revenue in each of the years ended December 31, 2019, 2018 and 2017. In addition, AT&T Inc., contributed 12% of our revenue in 2019. Our top five customers contributed approximately 40% of our revenue in 2019, approximately 38% of our revenue in 2018 and approximately 41% of our revenue in 2017. Factors that may affect our ability to grow our customer base include but are not limited to the following:

- 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.

Due to the nature of certain of our product offerings, the per-order revenue from orders placed by the majority of our new customers is generally lower than the per-order revenue generated from our historical customer orders. If we are unable to expand our customer base, we will be forced to rely on generating recurring revenue from existing customers, which may not be successful. We expect that, for the foreseeable future, the majority of our revenue will continue to depend on sales of our products to a limited number of existing customers or sales to customers with lower per-order revenue than those generated from our historical sales. Factors that may affect our ability to generate recurring revenue from our existing customers include but are not limited to the following:

- customer willingness to implement our products;
- pricing pressures due to the commoditization of our products;
- the timing of industry transitions to new network technologies;
- acquisitions of or by our customers;
- delays or difficulties that we may incur in completing the development and introduction of our planned products or product enhancements;
- failure of our products to perform as expected; and
- difficulties we may incur in meeting customers' delivery requirements or with software development, appliance design, manufacturing or marketing of our products and/or services.

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.

Third parties may terminate or alter existing contracts or relationships with us.

Third parties, including customers, suppliers, vendors, landlords, licensors and other business partners, with whom we have relationships, may terminate or otherwise reduce the scope of their relationship with us. Any such disruptions could cause us to suffer a loss of potential future revenue and/or lose rights that are material to our business.

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 pending merger between T-Mobile US, Inc. and Sprint Corporation (anticipated to close in early 2020);
- the acquisition of Blue Face Ltd. by Comcast Corporation in January 2020;
- the active network sharing partnership between Vodafone Group Plc and Telecom Italia Group in July 2019;
- the acquisition of Hawaiian Telecom, Inc. by Cincinnati Bell Inc. in July 2018;
- the acquisition of Level 3 Communications Inc. by CenturyLink Inc. in November 2017; and
- the acquisition of XO Communications, LLC by Verizon Communications Inc. in February 2017.

Further, consolidation has occurred in the vendor space, including:

- the closing of a strategic partnership between RingCentral, Inc. and Avaya Holdings Corp. in October 2019;
- the acquisition of Spoken Communications Inc. by Avaya Holdings Corp. in March 2018;
- the acquisition of Broadsoft, Inc. by Cisco Systems, Inc. in February 2018; and
- the acquisition of ShoreTel Inc. by Mitel Networks Corporation in September 2017.

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 $42.8 million in the aggregate in 2019, 2018 and 2017, comprised of $35.3 million for severance and related costs and $7.5 million related to facilities, including $3.7 million for accelerated amortization of lease assets. We expect to record nominal, if any, additional restructuring expense in 2020 in connection with our current initiatives. However, we may record additional restructuring expense 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 continue to restructure our business due to worldwide 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;
- decrease in cash and profits related to severance payments and facility termination costs;
- 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. We evaluate and monitor individual customer payment capability in granting such open credit arrangements, seeking to limit such open credit to amounts we believe our customers can pay and maintain reserves that we believe are adequate to cover exposure to doubtful accounts. However, there can be no assurance that our open credit customers will pay the amounts they owe to us or that the reserves we maintain will be adequate to cover such credit exposure. Our sales derived through our 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, 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. Project delays, changes in priority or solution re-design decisions by the systems integrator can adversely affect our product sales. 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.

In addition, we recognize some of our revenue based on a drop-ship model using information provided by our partners. If those partners provide us with inaccurate or untimely information, the amount or timing of our revenue could be adversely affected. We may also be impacted by financial failure of our partners, which could result in our inability to collect accounts receivable in full, and thereby materially adversely affect our results of operations and financial condition.

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.

Success in our industry requires large investments in technology and creates exposure to rapid technological and market changes. We spend a significant amount of time, money and resources both developing new technology, products and solutions and acquiring new businesses or business assets. Our strategic plan includes a significant shift in our investments from mature technologies that previously generated significant revenue for us toward certain next-generation technologies, as well as working with channel partners to sell our products. 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.

In order for us to be successful, our technologies, products and solutions must be accepted by relevant standardization bodies and by the industry as a whole. 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 is in the early stages of transitioning to the virtualization of networks, and we are developing products and services that we believe will be attractive to our customers and potential customers who make that shift. 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 could slow our revenue growth.

Virtualization of our product portfolio could slow our revenue growth as we move away from appliance products and increasingly focus on software-based products. Historically, we have produced highly complex products that incorporate appliances with embedded software components. 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, including costs related to our reliance on third-party contract manufacturers, interruptions or delays in the supply of appliance components from such third-party sources, and existing appliance support services. While we expect our margins to improve as a result of such reductions in cost, 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
- network performance penalties.

In addition to cooperating with our strategic partners 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; and
- failure to attract new customers or achieve market acceptance for our products.

Our large customers have substantial negotiating leverage, and they may require that we agree to terms and conditions that may have an adverse effect on our business.

Large communications service providers have substantial purchasing power and leverage in negotiating contractual arrangements with us. These customers may, among other things, require us to develop additional features, require penalties for failure to deliver such features, require us to partner with a certain reseller before purchasing our products and/or seek discounted product and/or service pricing. As we sell more products to this class of customer, we may be required to agree to terms and conditions that are less favorable to us, which may affect the timing of revenue recognition, amount of deferred revenue or product and service margins and may adversely affect our financial position and cash flows in certain reporting periods.

We depend upon contract manufacturers. 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 rely upon 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 to meet our customers' demands, 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, including commercial digital signal processors, from single or limited sources. Depending upon the component, there may or may not be alternative sources of substitutes. We purchase these components on a purchase order basis. 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 exposes us to potential supplier production difficulties, quality variations and unforeseen price increases. Our customers rely upon our ability to meet committed delivery dates, and any disruption in the supply of key components would seriously adversely affect our ability to meet these dates and could result in loss of customers, harm to our ability to attract new customers, or legal action by our customers. Defense-expedite rated orders from the U.S. federal government, which by law receive priority, can also interrupt scheduled shipments to our other customers. 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 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. Such alternate sources may not provide us with the same functionality as that currently provided to us.

The appliance products that we purchase from our third-party vendors have life cycles, and some of those products have reached the end of their life cycles. If we are unable to correctly estimate future requirements for these products, 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. The write-off of surplus inventory 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.

Because our larger scale products are sophisticated and designed to be deployed in complex networks around the world, they may have errors or defects that we find only after full deployment. These defects, and any failure to establish a support infrastructure and maintain required support levels, could seriously harm our business.

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. 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 are unable to fix errors or other performance problems that may be identified after full deployment of our products, we could experience:

- loss of, or delay in, revenue or increased expense;
- loss of customers and market share;
- failure to attract new customers or achieve market acceptance for our products;

- increased service, support and warranty costs and a diversion of development resources; and/or
- costly and time-consuming legal actions by our customers.

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. To continue to support our customers with these larger scale products, our support organization will need to provide service and support at a high level throughout the world. If we are unable to provide the expected level of support and service to our customers, we could experience:

- loss of customers and market share;
- failure to attract new customers in new markets and geographies;
- increased service, support and warranty costs and a diversion of development resources; and/or
- network performance penalties.

Any errors or defects in our products, and any failure to establish a support infrastructure and maintain required support levels, 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 the sales of our products to 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, none of which currently contemplates long-term purchase commitments. 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.

Furthermore, a majority of our government sales involve products that have or will soon reach the end of their life cycles, and such government sales for these older products have declined substantially in recent periods. Sales of our newer products to governmental agencies for broad deployment may not develop quickly, if at all, or be sufficient to offset future declines in sales of these legacy products. Additionally, spending by government customers fluctuates based on budget allocations and the timely passage of the annual federal budget.

Among the factors that could impact federal government spending and which would reduce our federal government contracting and subcontracting business are 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 that affect companies that provide services to the federal government, federal government shutdowns or other delays in the government appropriations process, changes in the political climate, including with regard to the funding for products we provide, delays in the payment of our invoices by government payment offices, 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 for such contracts or subcontracts, 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 a vendor's product 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"). Certain of our products are already certified by JITC. However, if we are unable to obtain JITC certification as needed, our DOD sales, and hence our revenue and results of operations, may suffer.

If we fail to realize the anticipated benefits from any recent acquisitions, such as our acquisition of Edgewater Networks, Inc. ("Edgewater") in August 2018 (the "Edgewater Acquisition") and Anova Data, Inc. ("Anova") in February 2019 (the "Anova Acquisition"), on a timely basis, or at all, our business and financial condition may be adversely affected.

We may fail to realize the anticipated benefits from any recent acquisitions, including the Edgewater Acquisition and the Anova Acquisition, on a timely basis, or at all, for a variety of reasons, including but not limited to the following:

- problems or delays in assimilating or transitioning to us the acquired assets, operations, systems, processes, controls, technologies, products or personnel;
- loss of acquired customer accounts;
- unanticipated costs associated with the acquisitions;
- failure to identify in the due diligence process or assess the magnitude of certain liabilities we assumed in the acquisitions, which could result in unexpected litigation or regulatory exposure, unfavorable accounting treatment, unexpected increases in taxes due, significant issues with product quality or development or other adverse effects on our business or results of operations;
- multiple or overlapping product lines as a result of the acquisitions that are offered, priced and supported differently, which could cause customer confusion and delays;
- higher than anticipated costs in continuing support and development of acquired products and services;
- diversion of management's attention from our core business and the challenges of managing larger and more widespread operations from the acquisitions;
- adverse effects on existing business relationships of any of the acquired businesses with their respective suppliers, licensors, contract manufacturers, customers, distributors, resellers and industry experts;
- significant impairment, exit and/or restructuring charges if the products or technologies acquired in the acquisitions do not meet our sales expectations or are unsuccessful;
- insufficient revenue to offset increased expenses associated with the acquisitions;
- risks associated with entering markets in which we have no or limited prior experience;
- potential loss of the employees we acquired in the acquisitions or our own employees; and/or
- failure to properly integrate internal controls and financial systems of the combined companies.

If we are unable to successfully manage these issues, the anticipated benefits and efficiencies of our recent acquisitions may not be realized fully or at all, or may take longer to realize than expected, and our ability to compete and our results of operations may be adversely affected.

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.

Other than with respect to the ECI Merger, we are not currently a party to any material pending merger or acquisition agreements. However, 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 debt or assume liabilities;
- significantly reduce our cash;
- incur significant impairment charges related to the write-off of goodwill and intangible assets;
- 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. The challenge of retaining key employees could be increasingly difficult due to strong industry competition. 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 Stock Incentive Plan to issue to our employees, or if our stockholders do not approve requested share increases or a new equity incentive plan. 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.

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

The terms of our credit agreement could adversely affect our operating flexibility and pose risks of default or springing maturity, 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.

Our credit facility with Silicon Valley Bank includes $100 million of commitments, the full amount of which is available for revolving loans plus a $50 million term loan, a $15 million sublimit that is available for letters of credit and a $15 million sublimit that is available for swingline loans. The senior secured credit facility is scheduled to mature in April 2024. The credit agreement includes procedures for additional financial institutions to become lenders, or for any existing lender to increase its commitment under the facility, subject to an available increase of $75 million for all incremental commitments under the credit agreement, without amendment. Provisions in the credit agreement 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.

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 credit facility at such time. If the maturity of our indebtedness is accelerated, 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 accelerated 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 our current credit facility and expect to have the option under our new credit facility to determine our interest rate that includes either the LIBOR rate or the base 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 our current 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 our current credit facility or our new credit facility.

We had $56.8 million of borrowings outstanding at a weighted average interest rate of 3.30% under the credit facility as of December 31, 2019. In addition, we had $5.4 million of letters of credit outstanding at an interest rate of 1.50% under the credit facility as of December 31, 2019. If we are prevented from borrowing or if we are unable to extend, renew or replace the credit facility by the maturity date of April 2024, 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. If the credit facility is subjected to the early springing maturity, 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.

We intend to fund the cash consideration relating to the proposed ECI Merger with proceeds received from a new credit facility that we expect to enter into with Citizens Bank, N.A. and Santander Bank, N.A., as joint arrangers and bookrunners, in connection with the closing of the ECI Merger (the "2020 Credit Facility"). Such cash consideration is expected to be financed through cash on hand and committed debt financing consisting of the new $400 million term loan facility portion of the 2020 Credit Facility. The 2020 Credit Facility is expected to retire our existing credit facility.

In addition, we cannot be sure that our current cash and available borrowings under our existing credit facility or our 2020 Credit Facility, as applicable, 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.

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. We have also been named as a defendant in securities class action and stockholder derivative lawsuits. 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 may require significant attention and resources of management. Regardless of the outcome, such litigation 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.

We have also been subject to employment claims in connection with employee terminations and may be subject to additional claims in the future. In addition, companies in our industry whose employees accept positions with us may claim that we have engaged in unfair hiring practices. These claims may result in material litigation. We could incur substantial costs defending ourselves or our employees against these claims, regardless of their merits. Further, defending ourselves from these types of claims could divert our management's attention from our operations. The quantity and cost of employment claims may rise as a result of our increasing international expansion and the proposed ECI Merger.

In addition, we are from time to time subject to investigations by the government. For example, we fully cooperated with an SEC inquiry regarding the development and issuance of Sonus' first quarter 2015 revenue and earnings guidance. We reached an agreement with the SEC in principle to resolve this matter and on August 7, 2018, the SEC's Division of Enforcement issued a Cease and Desist Order (the "Order"). As part of the Order, the findings of which we neither admitted nor denied, we agreed to pay a $1.9 million civil penalty and agreed not to violate the securities laws in the future. There is no assurance that we will not be subject to similar investigations by the SEC or other government agencies in the future.

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.

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. While we believe that we leverage best-in-class 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 a breach 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 be compromised, which 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 RTC 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 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, which can be up to four percent of worldwide revenue or 20 million Euros, whichever is greater. 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.

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.

One 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 uncertainties in the geopolitical environment, 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;
- risk of excess and obsolete inventories;
- excess facilities and manufacturing capacity; and/or

- higher overhead costs as a percentage of revenue and higher interest expense.

Continuing turmoil in the geopolitical environment in many parts of the world, as well as changes implemented by the current U.S. presidential administration, may continue to put pressure on global economic conditions which, in turn, could materially adversely affect our operating results.

If there is increased spending by service providers to invest in the rollout of 5G networks and services, such investment could negatively impact decisions by service providers to invest in markets in which Ribbon offers its products and solutions.

As service providers continue to invest in 5G networks and services, such increased expenditures in the 5G networks and services could negatively impact their investment on other non-5G related offerings and services in which Ribbon participates. Accordingly, our operating results could suffer.

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 coronavirus outbreak) 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.

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 Edgewater, Anova 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 Edgewater and Anova Acquisitions, neither Edgewater nor Anova was 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.

Changes to existing accounting pronouncements or taxation rules or practices may cause adverse fluctuations in our reported results of operations or affect how we conduct our business.

A change in accounting pronouncements or taxation rules or practices can have a significant effect on our reported results and may affect our reporting of transactions completed before the change is effective. New accounting pronouncements, taxation rules and varying interpretations of accounting pronouncements or taxation rules have occurred in the past and may occur in the future. For example, we were required to adopt the new revenue recognition standard in 2018 and have adopted the new lease accounting standard effective January 1, 2019. Any change to existing or any adoption of new accounting pronouncements or taxation rules, or the need for us to modify a current tax position may adversely affect our reported financial results or the way we conduct our business.

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

Under generally accepted accounting principles, we review our intangible assets for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Our intangible assets increased by approximately $11 million as a result of the Anova Acquisition in 2019, by approximately $57 million in 2018 as a result of the Edgewater Acquisition and by approximately $237 million in 2017 as a result of the Merger. Goodwill, which increased by approximately $6 million as a result of the Anova Acquisition in 2019, by approximately $48 million in 2018 as a result of the Edgewater Acquisition and by approximately $286 million in 2017 as a result of the Merger, is tested for impairment at least annually. Based on the results of our 2019 annual impairment test, we determined that our carrying value 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.

Risks Relating to our 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 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.

Claims that our current or future products infringe or misappropriate the proprietary rights of others could adversely affect our ability to sell those products and cause us to incur additional costs.

Substantial litigation over intellectual property rights exists in the telecommunications industry. We expect that we could be increasingly subject to third-party infringement claims as our revenue increases, the number of competitors grows and/or the functionality of products and technology in different industry segments overlaps. Third parties may currently have, or may eventually be issued, patents on which our current or future products or technologies may allegedly infringe. For example, we and our customers have received inquiries from intellectual property owners and may become subject to claims that we or our customers allegedly infringe the intellectual property rights of third parties. If a third party asserts that our products infringe upon their proprietary rights, we may be forced either to defend ourselves, our customers or contract manufacturers in litigation or to license their patents or other intellectual property for substantial royalty payments. These claims and any resulting licensing arrangement or lawsuit could subject us to significant royalty payments or liability for damages and invalidation of our proprietary rights. Any potential intellectual property litigation also could force us to do one or more of the following:

- delay shipments of, or stop selling, incorporating or using our products that use the challenged intellectual property;
- obtain from the owner of the infringed intellectual property right a license to sell or use the relevant technology, which license may not be available at acceptable prices, on acceptable terms, or at all; or
- redesign those products that use any allegedly infringing technology, if feasible.

Patent litigation, regardless of its outcome, will likely result in the expenditure of significant financial resources and the diversion of management’s time and resources. In addition, patent litigation may cause negative publicity and adversely impact our ability to gain prospective customers. If a third party's claim of infringement against us in a particular patent litigation is successful, and we could not develop non-infringing technology or license the infringed or similar technology on a timely and cost-effective basis, our revenue may decrease substantially, and we could be exposed to significant liability. A court could enter orders that temporarily, preliminarily or permanently enjoin us or our customers from making, using, selling, offering to sell or importing our current or future products, or could enter an order mandating that we undertake certain remedial activities. In addition, costs relating to indemnification provisions in our product agreements may be significant. At this time, it is not possible to predict the outcome of our ongoing lawsuits over intellectual property rights, including whether or not any proceedings will continue and when or how these matters will be resolved.

Risks Relating to our International Operations

We may face risks associated with our international expansion that could impair our ability to grow our international revenue. If we fail to manage the operational and financial risks associated with our international operations, it could have a material adverse effect on our business and results of operations.

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, and such operations will continue to require significant management attention and financial resources to successfully develop direct and indirect international sales and support channels. In addition, our international operations are subject to other inherent risks, including:

- reliance on channel partners;
- greater difficulty collecting accounts receivable and longer collection cycles;
- difficulties and costs of staffing and managing international operations;
- impacts of differing technical standards outside the United States;
- compliance with international trade, customs and export control regulations;
- reduced protection for intellectual property rights in some countries;
- 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;
- differing regulatory requirements, including tax laws, data privacy laws and labor regulations;
- challenging pricing environments in highly competitive new markets;
- foreign currency exchange controls, restrictions on repatriation of cash and changes in currency exchange rates;
- management communication and integration problems related to entering new markets with different languages, cultures and political systems;
- potential exposure to liability or damage of reputation resulting from a higher incidence of corruption or unethical business practices in some countries;
- greater risk of a failure of employees to comply with both U.S. and foreign laws, including antitrust regulations, the U.S. Foreign Corrupt Practices Act (“FCPA”) and any trade regulations ensuring fair trade practices;
- higher or more variable network service provider fees outside of the United States;
- any need to adapt and localize our products for specific countries;
- our ability to effectively price our products in competitive international markets;
- potentially adverse tax consequences; 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 imposed by the current presidential administration have and could in the future lead to retaliatory actions by affected countries, 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. 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.

Although we have not experienced a significant resulting increase in our manufacturing costs, if we were to do so, this eventually could make our products less competitive than those of our competitors whose imports are not subject to these tariffs. In addition, the U.S. administration has threatened to impose tariffs on all products imported from both Mexico and China. If this were to occur, we may not be able to mitigate the impacts of these tariffs and our business, results of operations and financial position could be materially adversely affected. Products we sell into certain foreign markets could also become subject to similar retaliatory tariffs, making the products we sell uncompetitive to similar products not subject to such import tariffs. Further changes in U.S. trade policies, tariffs, taxes, export restrictions or other trade barriers, or restrictions on raw materials or components, may limit our ability to manufacture products, increase our manufacturing costs, decrease our profit margins, reduce the competitiveness of our products, or inhibit our ability to sell products or purchase raw materials or components, which could have a material adverse effect on our business, results of operations and financial condition.

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 business and operations in the United Kingdom are exposed to potential disruptions and uncertainty relating to Brexit.

Following a national referendum and enactment of legislation by the government of the United Kingdom, the United Kingdom withdrew from the European Union ("Brexit") on January 31, 2020 and entered into a transition period during which it will continue its ongoing and complex negotiations with the European Union relating to the future trading relationship between the parties. Significant political and economic uncertainty remains about whether the terms of the relationship will differ materially from the terms before withdrawal, as well as about the possibility that a so-called "no deal" separation will occur if negotiations are not completed by the end of the transition period. These developments in turn may inhibit our sales, mobility of our personnel, and our access to capital. If the United Kingdom and the European Union are unable to negotiate acceptable terms or if other Member States pursue withdrawal, barrier-free access between the United Kingdom and other Member States or among the European economic area overall could be diminished or eliminated. Additionally, political instability in the European Union as a result of Brexit may result in a material negative effect on credit markets and foreign direct investments in the European Union and United Kingdom.

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. Our development efforts and other operations in these locations could involve significant risks, including:

- 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;
- heightened exposure to changes in economic, security and global political conditions; and
- fluctuations in currency exchange rates and tax compliance.

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 Relating to Legislation and Government Regulation

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 FCPA applies to companies, individual directors, officers, employees and agents. The UKBA is much broader and prohibits all bribery, in both the public and private sectors. Although the UKBA does not contain a separate financial records provision, such a requirement is captured under other U.K. legislation. 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 incorporating 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 of appliances, software and technology, as well as the provision of service. If we were to fail to comply with 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.

Furthermore, 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.

Additionally, any change in our products or in export or import regulations, economic sanctions or related legislation, shift in approach to the enforcement or scope of existing regulations or change in the countries, persons or technologies targeted by such regulations, could result in delays in the introduction of our products in international markets, decreased use of our products by, or in our decreased ability to export or sell our products to, existing or potential customers with international operations. Any decreased use of our products or limitation on our ability to export or sell our products would likely have a material adverse effect on our business and results of operations.

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.

Other laws and regulations, including in the areas of advertising, consumer affairs, data protection, finance, marketing, privacy, publishing and taxation requirements, are subject to change and differing interpretations. Changes in the political climate or in existing laws or regulations, or their interpretations, or the enactment of new laws or the issuance of new regulations or changes in enforcement priorities or activity could adversely affect our business by, among other things, increasing our administrative, compliance and other costs; forcing us to undergo a corporate restructuring; limiting our ability to engage in inter-company transactions with its affiliates and subsidiaries; increasing our tax obligations, including unfavorable outcomes from audits performed by various tax authorities; affecting our ability to continue to serve our customers and to attract new customers; affecting cash management practices and repatriation efforts; forcing us to alter or restructure our relationships with vendors and contractors; increasing compliance efforts or costs; limiting our use of or access to personal information; restricting our ability to market our products; and/or requiring us to implement additional or different programs and systems.

Compliance with regulations is costly and time-consuming, and we may encounter difficulties, delays or significant expenses in connection with compliance, and we may be exposed to significant penalties, liabilities, reputational harm and loss of business in the event that we fail to comply. While it is not possible to predict when or whether fundamental policy or interpretive changes would occur, these or other changes could fundamentally change the dynamics of our industry or the costs associated with our operations. Changes in public policy or enforcement priorities could materially affect our profitability, our ability to retain or grow business, or in the event of extreme circumstances, our financial condition.

Risks Related to our Common Stock

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

The market for technology stocks has been, and will likely continue to be, volatile. The following factors, among others, could cause the market price of our common stock to fluctuate significantly:

- addition or loss of any major customer;
- continued significant declines in customer spending in the media gateway trunking business;
- decreased spending by customers in the SBC and/or DSC security businesses;
- consolidation among our customers and/or our competitors in the telecommunications industry;
- changes in the financial condition or anticipated capital expenditures of any existing or potential major customer;
- economic conditions for the telecommunications, networking and related industries;
- quarterly variations in our bookings, revenue and operating results;
- failure to meet our earnings guidance or securities analysts’ estimates;
- changes in financial estimates by securities analysts;
- speculation in the press or investment community, and shorting of our stock by investors;
- announcements by us or our competitors of significant contracts, new products or acquisitions, distribution partnerships, joint ventures, mergers or capital commitments;
- activism by any single large stockholder or combination of stockholders;
- sales of common stock or other securities by us or by our stockholders, including the OEP Stockholders, in the future;
- securities and other litigation;
- developments with respect to intellectual property rights, including any related litigation;
- repurchases under our stock buyback program;
- departure of key personnel or other major changes in our board of directors or management;
- changes in governmental regulations;
- our ability to develop and market new and enhanced products on a timely basis;
- announcement of a stock split, reverse stock split, stock dividend or similar event; and/or
- emergence or adoption of new technologies or industry standards.

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 is consistently above $5.00, investors may short our stock. This may increase the volatility of our stock price.

We entered into a stockholders’ agreement with certain GENBAND stockholders in connection with the consummation of the Sonus and GENBAND merger, which provided such stockholders with certain rights that may differ from the rights of

our other stockholders. Such GENBAND stockholders may decide to sell their shares in bulk or from time to time, which timing we cannot control.

Effective October 27, 2017, we completed the merger (the "Merger") of Sonus Networks, Inc. ("Sonus"), GENBAND Holdings Company, GENBAND, Inc., and GENBAND II, Inc. (collectively, "GENBAND").

On October 27, 2017, in connection with the consummation of the Merger, we entered into a principal stockholders' agreement (the "Stockholders Agreement") with Heritage PE (OEP) II, L.P. and Heritage PE (OEP) III, L.P. (collectively with any successor entities, the "OEP Stockholders"), principal stockholders of GENBAND prior to the Merger. The Stockholders Agreement sets forth certain arrangements and contains various provisions relating to board representation, standstill restrictions and transfer restrictions as further described therein, including the right of the OEP Stockholders to designate up to five directors for nomination to our nine-member board of directors, subject to the OEP Stockholders maintaining certain levels of beneficial ownership of our common stock. Therefore, the OEP Stockholders will be able to exert significant influence over matters requiring board approval, and our stockholders other than the OEP Stockholders 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.

The ECI Merger Agreement provides that, at the time of the closing of the ECI Merger (the "Effective Time"), we and certain significant stockholders will enter into an amended and restated stockholders agreement (the "Restated Stockholders Agreement"). The Restated Stockholders Agreement will contain voting obligations, transfer restrictions, standstill provisions and preemptive rights that are substantially similar to the obligations that exist in the current Stockholders Agreement currently in effect between the Company and the OEP Stockholders.

Additionally, the ECI Merger Agreement provides that, at the Effective Time, the Company, the OEP Stockholders and ECI Holding (Hungary) kft or one of its affiliates will enter into an amended and restated registration rights agreement that is substantially similar to the current registration rights agreement currently in effect between the Company and the OEP Stockholders.

The OEP Stockholders own approximately 47% of our common stock as of January 31, 2020, and may decide to sell their shares in bulk or from time to time, except as provided under the Restated Stockholders Agreement, which timing we cannot control. The sale of their shares 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:

- 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;
- providing indemnification to our directors and officers;
- controlling the procedures for conduct and scheduling of Board and stockholder meetings;
- 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.

These provisions, alone or together, could delay hostile takeovers or changes in control of us or our management.

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.

Any provision of our amended and restated certificate of incorporation, our amended and restated by-laws or Delaware law that has the effect of delaying or deterring a change in control 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. Although we believe that our amended and restated certificate of incorporation, our amended and restated bylaws and provisions of Delaware law provide an opportunity for the Board of Directors to assure that our stockholders realize full value for their investment, they could have the effect of delaying or preventing a change of control that some stockholders may consider beneficial.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

During 2019, we initiated a plan to consolidate and reduce the number of facilities worldwide. This includes 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 North Dallas campus that is in close proximity locations of our Tier 1 U.S. customers. We expect to substantially complete our relocation and other site closure activities in the first half of 2020.

We also lease smaller (under 20,000 square feet) office space in various countries around the world for sales, marketing, engineering, development, 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, 2019, we maintained the following principal facilities:

Location	Principal use	Lease expiration
North Dallas, Texas (a)	Sales, marketing, engineering/development, customer support and general and administrative	September 2032
Plano, Texas (b)	Engineering/development, customer support, general and administrative and sales	February 2022
Ottawa, Canada (c)	Engineering/development, customer support and general and administrative	December 2029
Westford, Massachusetts	Corporate headquarters, engineering/development, customer support, general and administrative and sales	August 2028
Research Triangle Park, North Carolina	Engineering/development, customer support, general and administrative and sales	April 2027
Bangalore, India	Engineering/development, customer support and general and administrative	October 2024
Durham, North Carolina (d)	Warehouse	August 2021
Bangalore, India	Engineering/development, customer support and general and administrative	December 2023
San Jose, California	Engineering/development, customer support and sales	November 2023
Richardson, Texas (e)	Customer testing	January 2020
Prague, Czech Republic (c)	Customer support	October 2025
Maidenhead, United Kingdom (c)	Engineering/development, customer support and sales	July 2020

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(a) This facility is currently being fitted for occupancy. Upon completion, operations will be relocated from the Plano, Texas site.
(b) This facility will be vacated as part of our restructuring initiative to consolidate our North Texas operations and we will move into our new facility upon completion of the site.

(c) A portion of this facility was not in use at December 31, 2019 and is currently being subleased as part of a restructuring initiative.
(d) This facility was not in use at December 31, 2019 as part of a restructuring initiative and is currently being subleased.
(e) This facility will be vacated at the lease expiration date and relocated as part of our plans to consolidate our North Texas sites.

Item 3. Legal Proceedings

On November 8, 2018, Ron Miller, a purported stockholder of ours, filed a Class Action Complaint (the "Miller Complaint") in the United States District Court for the District of Massachusetts (the "Massachusetts District Court") against us and three of our former officers, Raymond P. Dolan, Mark T. Greenquist and Michael Swade (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 we 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, we are often a party to disputes and legal proceedings that we consider routine and incidental to our business. Management does not expect the results of any of these actions to have a material effect on our business or consolidated financial statements.

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.

Holders

At February 20, 2020, there were approximately 426 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 2019:

Period	Total Number of Shares Purchased (1)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (2)	Approximate Dollar Value of Shares that May Yet be Purchased Under the Plans or Programs (3)
October 1, 2019 to October 31, 2019	—	$ —	—	$ 70,463,973
November 1, 2019 to November 30, 2019	2,053	$ 3.00	—	$ 70,463,973
December 1, 2019 to December 31, 2019	34,593	$ 3.08	—	$ 70,463,973
Total	36,646	$ 3.08	—	$ 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 2019, 36,646 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.

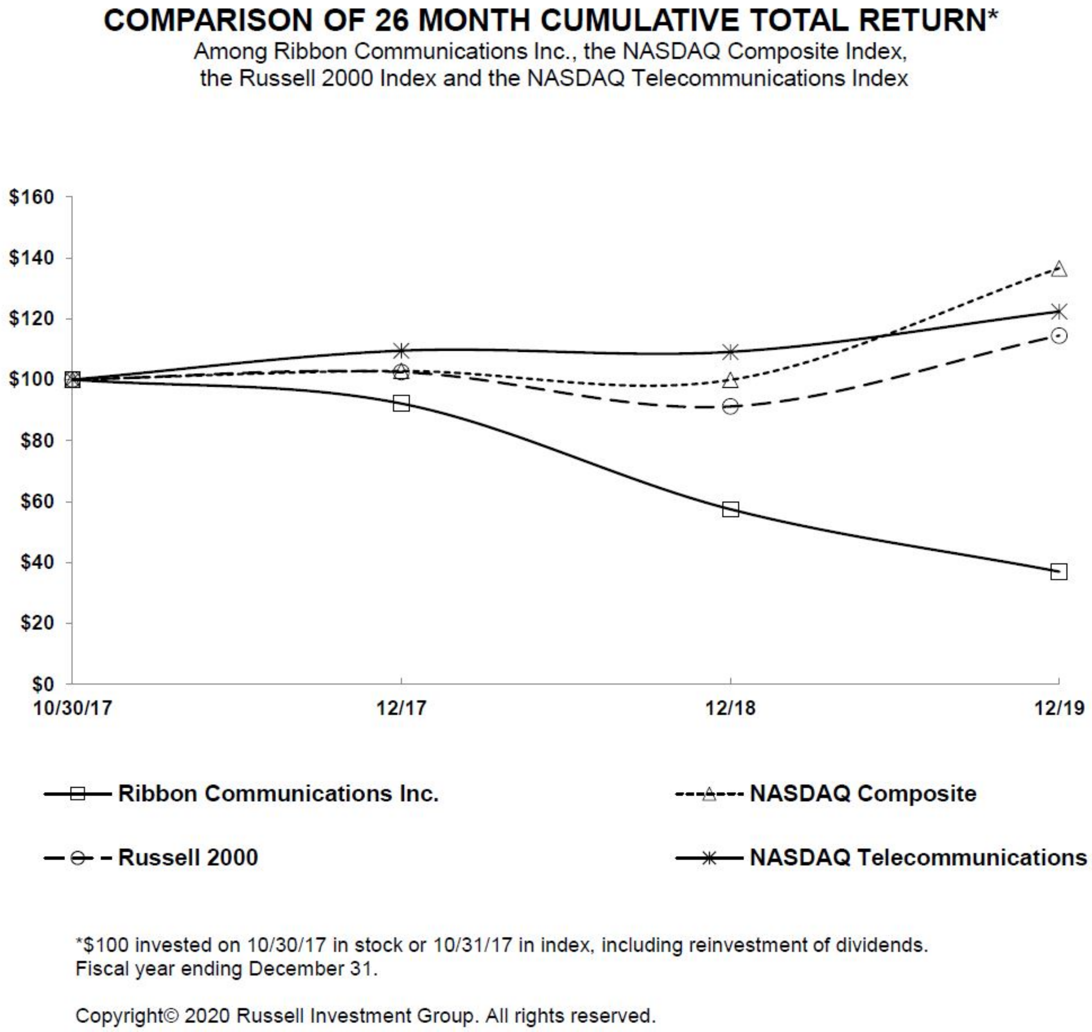
(2) On May 2, 2019, we announced a stock repurchase program, under which our Board of Directors has authorized the repurchase of up to $75 million of our common stock from time to time on the open market or in privately negotiated transactions prior to April 18, 2021 (the "Repurchase Program"). We did not repurchase any shares of our common stock under the Repurchase Program during the fourth quarter of 2019. At December 31, 2019, 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, 2019 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
Ribbon Communications Inc.	$ 100.00	$ 92.13	$ 57.45	$ 36.95
Nasdaq Composite	$ 100.00	$ 102.83	$ 99.91	$ 136.58
Russell 2000	$ 100.00	$ 102.47	$ 91.18	$ 114.45
Nasdaq Telecommunications	$ 100.00	$ 109.50	$ 109.10	$ 122.35

Item 6. Selected Financial Data

On October 27, 2017, (the "Merger Date"), Sonus and GENBAND completed the 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, 2019 and 2018 and for each of the years ended December 31, 2019, 2018 and 2017 have been derived from the audited consolidated financial statements included elsewhere herein. The selected consolidated financial data set forth below as of December 31, 2017, 2016 and 2015 and for each of the years ended December 31, 2016 and 2015 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)	**2019 (1)**	**2018 (2)**	**2017 (3)**	**2016 (4)**	**2015 (5)**
Revenue:					
Product	$ 262,030	$ 279,014	$ 181,119	$ 146,381	$ 141,913
Service	301,081	298,891	148,823	106,210	107,121
Total revenue	563,111	577,905	329,942	252,591	249,034
Cost of revenue:					
Product	133,347	142,185	70,250	47,367	50,460
Service	112,680	127,388	58,196	37,613	36,917
Total cost of revenue	246,027	269,573	128,446	84,980	87,377
Gross profit	317,084	308,332	201,496	167,611	161,657
Operating expenses:					
Research and development	141,060	145,462	101,481	72,841	77,908
Sales and marketing	117,962	128,276	83,403	68,539	72,841
General and administrative	53,870	66,036	47,642	35,948	39,846
Impairment of goodwill	164,300	—	—	—	—
Acquisition- and integration-related expense	12,953	16,951	14,763	1,152	131
Restructuring and related expense	16,399	17,015	9,436	2,740	2,148
Total operating expenses	506,544	373,740	256,725	181,220	192,874
Loss from operations	(189,460)	(65,408)	(55,229)	(13,609)	(31,217)
Interest and other income (expense), net	66,567	(8,002)	1,537	2,193	1,329
Loss before income taxes	(122,893)	(73,410)	(53,692)	(11,416)	(29,888)
Income tax (provision) benefit	(7,182)	(3,400)	18,440	(2,516)	(2,007)
Loss from continuing operations	(130,075)	(76,810)	(35,252)	(13,932)	(31,895)
Net loss	$ (130,075)	$ (76,810)	$ (35,252)	$ (13,932)	$ (31,895)
Loss per share:					
Basic					
Continuing operations	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)	$ (0.64)
	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)	$ (0.64)
Diluted					
Continuing operations	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)	$ (0.64)
	$ (1.19)	$ (0.74)	$ (0.60)	$ (0.28)	$ (0.64)
Shares used to compute loss per share:					
Basic	109,734	103,916	58,822	49,385	49,560
Diluted	109,734	103,916	58,822	49,385	49,560

(1) 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.
(2) 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.
(3) 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.
(4) 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.
(5) Includes the results of operations of the SDN Business of Treq Labs, Inc. for the period subsequent to its acquisition by the Company on January 2, 2015. The Company has not disclosed the revenue and earnings of the SDN Business for the periods since January 2, 2015, as these amounts are not significant to the Company's consolidated financial statements.

Consolidated Balance Sheet Data

(In thousands)	December 31, 2019	2018	2017	2016	2015
Cash and cash equivalents	$ 44,643	$ 43,694	$ 57,073	$ 31,923	$ 50,111
Marketable securities	$ —	$ 7,284	$ 17,224	$ 61,836	$ 58,533
Investments	$ —	$ —	$ 9,031	$ 32,371	$ 33,605
Working capital	$ 72,558	$ (11,219)	$ 39,417	$ 100,845	$ 117,692
Total assets	$ 814,908	$ 957,159	$ 910,883	$ 308,059	$ 312,891
Current portion of long-term debt	$ 2,500	$ —	$ —	$ —	$ —
Revolving credit facility	$ 8,000	$ 55,000	$ 20,000	$ —	$ —
Long-term debt, net of current	$ 45,995	$ —	$ —	$ —	$ —
Long-term debt, related party	$ —	$ 24,100	$ 22,500	$ —	$ —
Long-term deferred revenue	$ 20,482	$ 17,572	$ 14,184	$ 7,188	$ 7,374
Other long-term obligations	$ 16,589	$ 30,797	$ 13,189	$ 1,633	$ 2,760
Total stockholders' equity	$ 483,255	$ 590,298	$ 615,421	$ 219,122	$ 223,026

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

Overview

We are a leading provider of next generation ("NextGen") software solutions to telecommunications, wireless and cable service providers and enterprises across industry verticals. With over 1,000 customers around the globe, including some of the largest telecommunications service providers and enterprises in the world, we enable service providers and enterprises to modernize their communications networks through software and provide secure RTC solutions to their customers and employees. By securing and enabling reliable and scalable IP networks, we help service providers and enterprises adopt the next generation of software-based virtualized and cloud communications technologies for service providers to drive new, incremental revenue while protecting their existing revenue streams. Our software solutions provide a secure way for our customers to connect and leverage multivendor, multiprotocol communications systems and applications across their networks and the cloud, around the world and in a rapidly changing ecosystem of IP-enabled devices, such as smartphones and tablets. In addition, our software solutions secure cloud-based delivery of UC solutions - both for service providers transforming to a cloud-based network and for enterprises using cloud-based UC. We sell our software solutions through both direct sales and indirect channels globally, leveraging the assistance of resellers, and we provide ongoing support to our customers through a global services team with experience in design, deployment and maintenance of some of the world's largest software IP networks.

Presentation

Unless otherwise noted, all financial amounts, excluding tabular information, in this Management's Discussion and Analysis of Financial Condition and Results of Operations ("MD&A") are rounded to the nearest thousand dollar amount, and all percentages, excluding tabular information, are rounded to the nearest percentage point.

Unless otherwise noted, all forward-looking statements in this MD&A exclude the pending ECI Merger.

Business Acquisitions

Pending Merger

On November 14, 2019, we entered into an Agreement and Plan of Merger (the "ECI Merger Agreement") with Eclipse Communications Ltd., an indirect wholly-owned subsidiary of the Company ("Merger Sub"), Ribbon Communications Israel Ltd., ECI Telecom Group Ltd. ("ECI") and ECI Holding (Hungary) kft, pursuant to which Merger Sub will merge with and into ECI, with ECI surviving such merger as a wholly-owned subsidiary of the Company (the "ECI Merger").

Our Board of Directors (the "Board") unanimously approved the ECI Merger Agreement and the transactions contemplated thereby. Our stockholders approved the issuance of 32.5 million shares of our common stock (the "ECI Stock Consideration") as partial consideration in the ECI Merger.

As provided in the ECI Merger Agreement, at the time of the closing, all equity securities of ECI issued and outstanding immediately prior to the closing will be converted into the right to receive consideration consisting of $324 million in cash (the "ECI Cash Consideration") and the ECI Stock Consideration, less the amount of indebtedness of ECI. ECI equityholders will also receive approximately $31 million from ECI's sale of real estate assets. We intend to fund the ECI Cash Consideration with proceeds from a new $500 million credit facility that we expect to enter into with Citizens Bank, N.A. and Santander Bank, N.A., as joint lead arrangers and bookrunners, in connection with the closing of the ECI Merger (the “2020 Credit Facility”). The 2020 Credit Facility consists of a $400 million term loan, which will be used in part to fund the merger, and a $100 million revolver that is projected to be undrawn at closing. The 2020 Credit Facility will retire our existing credit facility. Immediately following the closing, it is expected that the former holders of ECI will own approximately 23% of our outstanding common shares. The ECI Merger is expected to close in the first quarter of 2020, subject to regulatory approvals and customary closing conditions.

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 NextGen products provide a cloud-native, streaming analytics platform for network and subscriber optimization and monetization. The Company believes that the Anova Acquisition is reinforcing and extending

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 0.3 million shares of our common stock with a fair value of $1.7 million, some or all of which could be issued subject to post-closing adjustments (the "Anova Deferred Consideration"). The Anova Deferred Consideration is included as a component of Accrued expenses and other current liabilities 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 period 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, approximately $46 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 million of cash, $15 million of which was to be paid six months from the Edgewater Acquisition Date and the other $15 million of which was to be paid as early as nine months from the Edgewater Acquisition Date and no later than 18 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 reduction to the Edgewater Deferred Consideration of $8.1 million in Other income, 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.

GENBAND

On October 27, 2017 (the "Merger Date"), Sonus Networks, Inc. ("Sonus") consummated an acquisition as specified in an Agreement and Plan of Merger (the “Merger Agreement”) with Solstice Sapphire Investments, Inc. ("NewCo") and certain of its wholly-owned subsidiaries, GENBAND Holdings Company, GENBAND Inc. and GENBAND II, INC. (collectively, "GENBAND") such that, following a series of mergers (collectively, the "Merger"), Sonus and GENBAND each became a wholly-owned subsidiary of NewCo.

As a result of the Merger, we believe we are better positioned to enable network transformations to IP and to cloud-based networks for service providers and enterprise customers worldwide, with a broader and deeper sales footprint, increased ability to invest in growth, more efficient and effective research and development, and a comprehensive RTC product offering.

Pursuant to the Merger Agreement, NewCo issued 50.9 million shares to the GENBAND equity holders, with the number of shares issued in the aggregate to the GENBAND equity holders equal to the number of shares of Sonus common stock outstanding immediately prior to the closing date of the Merger, such that former stockholders of Sonus would own 50%, and former shareholders of GENBAND and the two related holding companies would own 50% of the shares of NewCo common stock issued and outstanding immediately following the consummation of the Merger.

The Merger has been accounted for as a business combination and the financial results of GENBAND have been included in our consolidated financial statements beginning on the Merger Date. On November 28, 2017, the Company changed its name from "Sonus Networks, Inc." to "Ribbon Communications Inc."

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, net, in our consolidated statement of operations for the year ended December 31, 2019.

Financial Overview

For a discussion of our results of operations for the year ended December 31, 2017, including a year-to-year comparison between 2018 and 2017, and a discussion of our liquidity and capital resources for the year ended December 31, 2017, refer to Part II, Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations" in our Annual Report on Form 10-K/A for the year ended December 31, 2018.

Financial Results

We reported losses from operations of $189 million for 2019 and $65 million for 2018. We reported net losses of $130 million for 2019 and $77 million for 2018.

Our revenue was $563 million in 2019 and $578 million in 2018. Our gross profit was $317 million in 2019 and $308 million in 2018. Our gross profit as a percentage of revenue ("total gross margin") was 56% in 2019 and 53% in 2018.

Our operating expenses were $507 million in 2019 and $374 million in 2018. Our 2019 operating expenses included $164 million for the impairment of goodwill, $13 million of acquisition- and integration-related expenses, primarily related to the pending ECI Merger, and $16 million of restructuring expense, primarily related to severance and related costs. Our 2018 operating expenses included $17 million of acquisition- and integration-related expenses, primarily related to the Merger and, to a lesser extent, to the Edgewater Acquisition, and $17 million of restructuring expense, primarily related to severance and related costs.

We recorded stock-based compensation expense of $13 million in 2019 and $11 million in 2018. 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, Franklin Hobbs, 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, 2019 and 2018.

Restructuring and Cost Reduction Initiatives

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. In connection with this initiative, we expect to reduce our focus on hardware and appliance-based development over time and to increase our development focus on software virtualization, functional simplicity and important customer requirements. 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 by the end of 2020.

In connection with the 2019 Restructuring Initiative, we recorded restructuring and related expense of $11 million in the year ended December 31, 2019, comprised of $6 million for severance and related costs for approximately 120 employees, $1 million for variable and other facilities-related costs and $4 million for accelerated amortization of lease assets. We expect that nearly all of the amount accrued for severance and related costs will be paid by the end of the first half of 2020. We estimate that we will record nominal, if any, additional restructuring and related expense related to severance and related costs under the 2019 Restructuring Initiative.

In connection with the Merger, we 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 the Merger Restructuring Initiative, we recorded $5 million of restructuring and related expense 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 the Merger Restructuring Initiative in 2018, comprised of $15 million for severance and related expenses for approximately 275 employees and $1 million in connection with redundant facilities located in the Czech Republic, Canada and the U.S. We recorded $9 million of restructuring expense in connection with the Merger Restructuring Initiative in 2017 for severance and related expenses for approximately 120 employees. The Merger Restructuring Initiative is substantially complete, and we anticipate that we will record nominal future expense, if any, in connection with this initiative. In connection with the adoption of Accounting Standards Codification ("ASC") 842, *Leases* ("ASC 842"), effective January 1, 2019, we wrote off the remaining restructuring accrual related to facilities. We expect that the amount accrued at December 31, 2019 for severance and related expenses will be paid by the end of the first half of 2020.

We assumed GENBAND's restructuring liability aggregating $4 million at the Merger Date (the "GENBAND Restructuring Initiative"), primarily related to headcount reductions. In 2018, we recorded $1 million of restructuring expense 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, and we do not expect to record future expense in connection with this initiative.

On July 25, 2016, we announced a program (the "2016 Restructuring Initiative") to further accelerate our investment in new technologies as the communications industry migrates to a cloud-based architecture and to pursue new strategic initiatives, such as new products and an expanded go-to-market footprint in selected geographies and discrete vertical markets. We have recorded an aggregate of $2 million of restructuring expense in connection with this initiative, primarily for severance and related costs. The actions under the 2016 Restructuring Initiative were completed in 2019 and accordingly, no additional expense will be recorded in connection with this initiative.

In connection with the acquisition of Taqua, we implemented a restructuring plan in the third quarter of 2016 to eliminate certain redundant positions within the combined companies. On October 24, 2016, the Audit Committee of our Board (the "Audit Committee") approved a broader Taqua restructuring plan related to headcount and redundant facilities (collectively, the "Taqua Restructuring Initiative"). In connection with this initiative, we have recorded $2 million of restructuring expense for severance and related costs and estimated costs related to the elimination of redundant facilities. The actions under the Taqua Restructuring Initiative have been completed and accordingly, no additional expense will be recorded in connection with this initiative. In connection with the adoption of ASC 842 effective January 1, 2019, we wrote off the remaining restructuring accrual related to redundant facilities.

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, loss contingencies and reserves, stock-based compensation, business combinations, goodwill and intangible assets, accounting for leases and accounting for income taxes.

Revenue Recognition. We account for revenue in accordance with ASC 606, *Revenue from Contracts with Customers* ("ASC 606"), which we adopted on January 1, 2018 using the modified retrospective method.

We derive revenue from two primary sources: products (software and non-software products) and services. Software and non-software product revenue is generated from sales of our software with proprietary appliances that function together to deliver the products' essential functionality. Software and appliances 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 appliances 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 do not recognize software revenue related to the renewal of subscription software licenses earlier than the beginning of the subscription period. Appliance products are generally sold with software to provide the customer solution.

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 and do not cover anything beyond ensuring that the product is functioning as intended. Based on the guidance in ASC 606, 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. 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.

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 or identifiable intangible 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.

Our annual testing for impairment of goodwill is completed as of November 30. We operate as a single operating segment with one reporting unit and consequently we evaluate 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, which encompasses a discounted cash flow analysis and a guideline public company analysis using selected multiples. 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.

We performed our assessments for the years ended December 31, 2018 and 2017 and determined that in each such year, our fair value was in excess of our carrying value and accordingly, there was no impairment of goodwill.

At certain times during both 2019 and 2018, including at our annual testing date of November 30, 2018, our market capitalization was below our book value. While we concluded that our fair value exceeded carrying value at November 30, 2018, we regularly monitored for changes in circumstances, including changes to our projections regarding performance of the business, that could result in impairment of goodwill.

Leases. Effective January 1, 2019, we adopted Accounting Standards Update ("ASU") 2016-02, *Leases (Topic 842) Section A - Leases: Amendments to the FASB Accounting Standards Codification* ("ASU 2016-02"), the new standard on accounting for leases. ASU 2016-02 introduces a lessee model that brings most leases onto the balance sheet and eliminates the current GAAP requirement for an entity to use bright-line tests in determining lease classification. We must 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 instead 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.

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 our existing leases do not have a readily determinable implicit rate, we use our incremental borrowing rate based on the information available at the commencement date in determining the present value of future minimum fixed lease payments. We calculate our incremental borrowing rate to reflect the interest rate that we 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 consider our 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. We assessed our right-of-use assets for impairment as of December 31, 2019 and determined no impairment has occurred.

Lease terms may include options to extend or terminate the lease and we incorporate such options in the lease term when we have the unilateral right to make such an election and it is reasonably certain that we will exercise that option. In making this determination, we consider our prior renewal, termination history and planned usage of the assets under lease, incorporating expected market conditions.

For restructuring events that involve lease assets and liabilities, we apply lease reassessment and modification guidance and evaluate the right-of-use assets for potential impairment. If we plan to exit all or distinct portions of a facility and do not have the ability or intent to sublease, we will accelerate the amortization of each of these lease components through the vacate date. The accelerated amortization is recorded as a component of Restructuring and related expense in our consolidated statements of operations. Related variable lease expenses will continue to be expensed as incurred through the vacate date, at which time we 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.

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 2019. 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 are responsible for assumptions utilized, 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, 2019, we had valuation allowances of $71 million to offset net domestic deferred tax assets of $72 million. In addition, we had valuation allowances to offset Canada federal credits carryovers of $11 million, Ireland net deferred tax assets of $9 million and Brazil net deferred tax assets of $3 million. 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, 2019, with the exception of the Company's Irish subsidiary, as we do not plan to permanently reinvest these amounts outside the U.S. The repatriation of the undistributed earnings would result in withholding taxes imposed on the repatriation. Consequently, we have recorded a tax liability of $5 million, consisting of potential withholding and distribution taxes related to undistributed earnings from these subsidiaries as of December 31, 2019. Had the earnings of the Irish subsidiary been determined to not be permanently reinvested outside the U.S., no additional deferred tax liability would be required due to no withholding taxes or income tax expense being imposed on such repatriation.

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 will 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.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act makes broad and complex changes to the U.S. tax code, including, but not limited to: reducing the U.S. federal corporate tax rate from 35% to 21%; requiring companies to pay a one-time transition tax on certain unrepatriated earnings of foreign subsidiaries; generally eliminating U.S. federal income taxes on dividends from foreign subsidiaries; requiring a current inclusion in U.S. federal taxable income of certain earnings (Global Intangible Low-taxed Income) ("GILTI") of controlled foreign corporations; eliminating the corporate alternative minimum tax ("AMT") and changing how existing AMT credits can be realized; creating the base erosion anti-abuse tax; creating a new limitation on deductible interest expense; changing rules related to uses and limitations of net operating loss carryforwards created in tax years beginning after December 31, 2017; providing a tax deduction for foreign-derived intangible income; and changing rules related to deductibility of compensation for certain officers.

We completed our accounting for the effects of the Tax Act in the fourth quarter of 2018 and the effects of the Tax Act were reflected in in our 2018 tax provision. We considered the impact of the Base Erosion and Anti-Abuse Tax ("BEAT"), the GILTI, the deduction for foreign derived intangible income and other provisions of the Tax Act when preparing our 2018 tax provision. Based on this analysis, we recorded BEAT tax expense of $0.4 million in 2018 and recorded an adjustment to the provisional amounts previously recorded related to the Tax Act that decreased our deferred tax assets by $0.2 million. When the 2018 Federal tax return was filed, there was no BEAT tax expense. The related true-up was recorded as a provision to return adjustment in the 2019 tax provision.

Results of Operations

Years Ended December 31, 2019 and 2018

Revenue. Revenue for the years ended December 31, 2019 and 2018 was as follows (in millions, except percentages):

	Year ended December 31,		Increase (decrease) from prior year	
	2019	2018	$	%
Product	$ 262.0	$ 279.0	$ (17.0)	(6.1)%
Service	301.1	298.9	2.2	0.7 %
Total revenue	$ 563.1	$ 577.9	$ (14.8)	(2.6)%

Our product revenue is generated from sales of software with attached appliances, software licenses and software subscription fees. Certain of our products may be included in more than one of our solutions (session control solutions, network transformation solutions, and applications and security solutions), depending upon the configuration of the individual customer solutions sold. Our software with attached appliances and software license revenues are primarily comprised of our media gateway, call controller, signaling, virtual mobile core, security and management products. Our software subscription fees revenue is primarily comprised of sales of our UC-related (i.e., application server, media server, etc.) and Kandy Cloud products. Each of our solutions portfolios addresses both the service provider and enterprise markets and are sold through both our direct sales program and from indirect sales through our channel partner program.

The decrease in our product revenue in 2019 compared to 2018 was primarily the result of $39 million of lower sales of software with attached appliances, partially offset by $22 million of higher sales of our software licenses and subscriptions.

In 2019, 27% of our product revenue was attributable to sales to enterprise customers, compared to 21% in 2018. These sales were made through both our direct sales team and indirect sales channel partners.

In 2019, 36% of our product revenue was from indirect sales through our channel partner program, compared to 25% in 2018.

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 appliance and software maintenance and support (“maintenance revenue”) and network design, installation and other professional services (“professional services revenue”).

Service revenue for the years ended December 31, 2019 and 2018 was comprised of the following (in millions, except percentages):

	Year ended December 31,		Increase from prior year	
	2019	2018	$	%
Maintenance	$ 234.2	$ 234.0	$ 0.2	0.1%
Professional services	66.9	64.9	2.0	3.0%
Total service revenue	$ 301.1	$ 298.9	$ 2.2	0.7%

Our maintenance revenue was essentially unchanged in 2019 compared to 2018, as expected industry consolidation and the resulting pricing pressure were offset by the sale of new software products under maintenance support. The increase in professional services revenue was primarily due to the timing and related revenue recognition of certain projects in 2019 compared to 2018.

The following customers contributed 10% or more of our revenue in the years ended December 31, 2019 and 2018:

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

* Less than 10% of total revenue.

Revenue earned from customers domiciled outside the United States was 39% of revenue in 2019 and 42% of revenue in 2018. 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, 2019 and 2018 was disaggregated geographically as follows:

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
Japan	13,065	11,692	5,842	30,599
Other Asia Pacific	17,552	16,106	4,879	38,537
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
Japan	23,108	11,234	5,069	39,411
Other Asia Pacific	30,575	12,321	4,358	47,254
Other	17,988	31,273	7,872	57,133
	$ 279,014	$ 233,966	$ 64,925	$ 577,905

Our deferred product revenue was $5 million at December 31, 2019 and $14 million at December 31, 2018. Our deferred service revenue was $116 million at December 31, 2019 and $108 million at December 31, 2018. 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 2020 will increase slightly compared with our 2019 total revenue.

Cost of Revenue/Gross Margin. Our cost of revenue consists primarily of amounts paid to third-party manufacturers for purchased materials and services, royalties, and manufacturing and services personnel and related costs. Our cost of revenue and gross margins for the years ended December 31, 2019 and 2018 were as follows (in millions, except percentages):

	Year ended December 31,		Decrease from prior year	
	2019	2018	$	%
Cost of revenue				
Product	$ 133.3	$ 142.2	$ (8.9)	(6.2)%
Service	112.7	127.4	(14.7)	(11.5)%
Total cost of revenue	$ 246.0	$ 269.6	$ (23.6)	(8.7)%
Gross margin				
Product	49.1%	49.0%		
Service	62.6%	57.4%		
Total gross margin	56.3%	53.4%		

Our product gross margin in 2019 was essentially unchanged compared with 2018. The gross margin benefit of increasing sales of higher gross margin software products was offset by the inclusion of a full year of Edgewater product sales in 2019, as Edgewater products include attached appliances as part of a sales order. Our purchases of materials and components were $70 million in 2019, compared with $75 million in 2018. The reduction in 2019 reflects the higher software content of our 2019 sales as a percentage of total product revenue compared with 2018, offset by the inclusion of a full year of Edgewater attached appliance purchases. We expect that our future purchases of materials and components will decrease as a result of the increasing software content of our products, both in absolute terms and as a percentage of revenue.

The increase in service gross margin in 2019 compared to 2018 was primarily due to efficiency measures undertaken in our professional sales organization.

We believe that our total gross margin will increase in 2020 compared to 2019, primarily due to the expected higher software content as a percentage of our total revenue, coupled with the impact of our restructuring and integration cost reduction initiatives.

Research and Development Expenses. Research and development 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, 2019 and 2018 were as follows (in millions, except percentages):

Year ended December 31,		Decrease from prior year	
2019	2018	$	%
$ 141.1	$ 145.5	$ (4.4)	(3.0)%

The decrease in research and development expenses in 2019 compared with 2018 was primarily attributable to $6 million of lower employee-related expenses, partially offset by $1 million of higher product development expense (i.e., third-party development, prototype and test equipment costs) and $1 million of higher infrastructure-related expenses. The decrease in employee-related expenses was primarily attributable to lower salary and related expenses, reflecting the impact of our restructuring and cost savings initiatives.

Some aspects of our research and development 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 research and development expenses in 2020 will benefit from our ongoing restructuring and cost savings initiatives, partially offset by our increased investment in our software solutions.

Sales and Marketing Expenses. 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, 2019 and 2018 were as follows (in millions, except percentages):

Year ended December 31,		Decrease from prior year	
2019	2018	$	%
$ 118.0	$ 128.3	$ (10.3)	(8.0)%

The decrease in sales and marketing expenses in 2019 compared with 2018 was primarily attributable to $12 million of lower employee-related expenses, partially offset by $1 million of higher amortization of acquired intangible assets and $1 million of net increases in other sales and marketing expenses. The decrease in employee-related expenses was primarily attributable to lower salary and related expenses, reflecting the impact of our restructuring and cost savings initiatives.

We believe that our sales and marketing expenses will increase in 2020 compared with 2019, primarily due to higher amortization of intangible assets arising from prior acquisitions, coupled with slightly higher employee-related expenses.

General and Administrative Expenses. 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, 2019 and 2018 were as follows (in millions, except percentages):

Year ended December 31,		Decrease from prior year	
2019	2018	$	%
$ 53.9	$ 66.0	$ (12.1)	(18.4)%

The decrease in 2019 general and administrative expenses compared with 2018 was primarily attributable to $5 million of lower employee-related expenses, $4 million of lower legal fees and $3 million of lower consulting fees. The decrease in employee-related expenses was primarily attributable to lower salary and related expenses, reflecting the impact of our restructuring and cost savings initiatives.

We believe that our general and administrative expenses will decrease in 2020 compared with 2019, primarily due to savings from our restructuring and integration cost savings initiatives.

Impairment of Goodwill. Our annual testing for impairment of goodwill is completed as of November 30. We operate as a single operating segment with one reporting unit and consequently evaluate 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- and Integration-Related Expenses. Acquisition- and integration-related expenses include those expenses related to acquisitions that we would otherwise not have incurred. Acquisition-related expenses include 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. 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 $13 million of acquisition- and integration-related expenses in 2019, comprised of $9 million of acquisition-related expenses and $4 million of integration-related expenses. The acquisition-related expense primarily related to the pending ECI Merger 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 Merger.

We recorded $17 million of acquisition- and integration-related expenses in 2018, comprised of $10 million of acquisition-related expenses and $7 million of integration-related expenses. The acquisition-related expense primarily related to the Merger, with nominal amounts related to the acquisition of Edgewater and other acquisition-related activities.

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

Restructuring and Related Expense. 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 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. We recorded $17 million of restructuring and related expense in 2018, comprised of $16 million in connection with our Merger Restructuring Initiative and $1 million for changes in estimated costs in connection with our assumption of GENBAND's restructuring liability at the time of Merger.

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, 2019 and 2018 were as follows (in millions, except percentages):

	Year ended December 31,		Increase (decrease) from prior year	
	2019	2018	$	%
Interest income	$ 0.6	$ 0.3	$ 0.3	100.0 %
Interest expense	(4.5)	(4.5)	—	— %
Interest (expense) income, net	$ (3.9)	$ (4.2)	$ (0.3)	(7.1)%

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 Merger.

Interest expense in 2018 was primarily comprised of interest on the promissory note issued to certain of GENBAND's equityholders in connection with the Merger, the outstanding revolving credit facility balance and the amortization of debt issuance costs in connection with our revolving credit facilities. Interest income consisted of interest earned on our cash equivalents, marketable securities and investments.

Other Income (Expense), Net. We recorded a gain of $63 million from the settlement of litigation with Metaswitch in 2019 and a gain of $8 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 2019 and were partially offset primarily by expense related to foreign currency translation. Our other expense, net, in 2018 was $4 million, and was primarily comprised of expense related to foreign currency translation.

Income Taxes. We recorded income tax provisions of $7 million in 2019 and $3 million in 2018. The provision recorded in 2019 was primarily the result of foreign operations and valuation allowances established. The provision recorded in 2018 was primarily the result of foreign operations.

During 2019 and 2018, 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 against our domestic deferred tax asset. A similar analysis and conclusion was made with regard to the valuation allowance on the deferred tax assets of our foreign subsidiaries, mainly the Irish and Brazilian subsidiaries. In analyzing the deferred tax assets related to our Canadian subsidiaries, we concluded that it was more likely than not that the Canadian federal credits would not be realized in a future period.

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 millions):

Year ended December 31, 2019 compared to year ended December 31, 2018	**Year ended December 31,**		
	2019	**2018**	**Change**
Net loss	$ (130.1)	$ (76.8)	$ (53.3)
Adjustments to reconcile net loss to cash flows provided by (used in) operating activities	236.4	77.1	159.3
Changes in operating assets and liabilities	(50.6)	(9.9)	(40.7)
Net cash provided by (used in) operating activities	$ 55.7	$ (9.6)	$ 65.3
Net cash used in investing activities	$ (3.5)	$ (35.4)	$ 31.9
Net cash (used in) provided by financing activities	$ (51.3)	$ 31.8	$ (83.1)

We had $45 million of cash at December 31, 2019. Our cash, cash equivalents and marketable securities totaled $51 million at December 31, 2018. We had cash held by our non-U.S. subsidiaries aggregating $12 million at December 31, 2019 and $11 million at December 31, 2018. If we elect to repatriate all of the funds held by our non-U.S. subsidiaries as of December 31, 2019, 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 December 21, 2017, we entered into a Senior Secured Credit Agreement (the “2017 Credit Facility”) with Silicon Valley Bank ("SVB"), which refinanced the prior credit agreement with SVB that the Company had assumed in connection with the Merger. On June 24, 2018, we amended the 2017 Credit Facility to, among other things, permit the Edgewater Acquisition and related transactions (the "2018 Credit Facility"). At December 31, 2018, we had an outstanding debt balance of $55 million at an average interest rate of 5.96% and $3 million of outstanding letters of credit at an average interest rate of 1.75% under the 2018 Credit Facility. We were in compliance with all covenants of the 2018 Credit Facility at December 31, 2018.

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") with SVB, as lead agent. The 2019 Credit Facility provides 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 includes 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 all incremental commitments under the 2019 Credit Facility. The 2019 Credit Facility is scheduled to mature in 2024. 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 are unconditionally guaranteed on a senior secured basis by us and each of our other material U.S. domestic subsidiaries (collectively, the "Guarantors"). The 2019 Credit Facility is secured by first-priority liens on substantially all of our assets.

The 2019 Credit Facility requires periodic interest payments on outstanding borrowings under the facility until maturity. We may 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 bear 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 varies depending on our consolidated leverage ratio (as defined in the 2019 Credit Facility). The base rate and the LIBOR rate are each subject to a zero percent floor.

The 2019 Credit Facility requires compliance with certain financial covenants, including a minimum consolidated quick ratio, minimum consolidated fixed cover charge coverage ratio and maximum consolidated leverage ratio, all of which are 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.

In addition, the 2019 Credit Facility contains various covenants that, among other restrictions, limit our and our 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 our business; modifying our organizational documents; and amending or making prepayments on certain junior debt.

The 2019 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 a borrower occurs, all obligations under the 2019 Credit Facility will immediately become due and payable. If any other event of default exists under the 2019 Credit Facility, the lenders may 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 exists under the 2019 Credit Facility, the lenders may commence foreclosure or other actions against the collateral.

If any default exists under the 2019 Credit Facility, or if the Borrower is unable to make any of the representations and warranties as stated in the 2019 Credit Facility at the applicable time, the Borrower will 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 a material adverse effect on the Borrower’s liquidity and working capital.

We intend to fund the cash consideration relating to the proposed ECI Merger with proceeds received from a new credit facility that we expect to enter into with Citizens Bank, N.A. and Santander Bank, N.A., as lead arrangers, in connection with the closing of the ECI Merger. Such cash consideration is expected to be financed through cash on hand and committed debt financing consisting of a new $400 term loan facility and new $100 million revolving credit facility (together, the "2020 Credit Facility"), which is projected to be undrawn at close. The 2020 Credit Facility is expected to retire our 2019 Credit Facility.

In connection with the Merger, on October 27, 2017, we issued a promissory note for $23 million to certain of GENBAND's equity holders (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. At December 31, 2018, the Promissory Note balance was $24 million, comprised of $22 million of principal plus $2 million of interest converted to principal. 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 $25 million and comprised of $23 million of principal plus $2 million of interest converted to principal. We did not incur any early termination penalties in connection with this repayment.

In the second quarter of 2019, our Board approved a stock repurchase program pursuant to which we may repurchase up to $75 million of the Company's 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.

Our operating activities provided $56 million of cash in 2019 and used $10 million of cash in 2018.

In 2019, our cash flow from operating activities 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 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.

Cash used in operating activities in 2018 was primarily the result of lower accrued expenses and other long-term liabilities and accounts payable, coupled with higher accounts receivable and other operating assets. These were partially offset by higher deferred revenue, lower inventory, and the net impact of non-cash items against our net loss. The decrease in accrued expenses and other long-term liabilities is primarily related to lower accruals for taxes and professional fees. 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 increase in accounts receivable primarily relates to the Edgewater Acquisition. Our net loss, adjusted for non-cash items such as depreciation, amortization, stock-based compensation, deferred income taxes and other non-cash items, including foreign currency exchange losses, was virtually break-even.

Our investing activities used $4 million and $35 million of cash in 2019 and 2018, respectively. In 2019, we used $11 million to purchase property and equipment, partially offset by $7 million of maturities of marketable securities. In 2018, we used $46 million to pay the cash consideration for the Edgewater Acquisition and $8 million to purchase property and equipment, partially offset by $19 million of sales/maturities of marketable securities.

Our financing activities used $51 million of cash in 2019 and provided $32 million of cash in 2018.

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.

Cash provided by financing activities in 2018 was primarily comprised of $35 million of net borrowings against our 2018 Credit Facility, partially offset by $2 million used to pay withholding obligations related to the net share settlement of restricted and performance-based stock grants upon vesting and $1 million in the aggregate used to make principal payments on our finance lease obligations and debt issuance costs related to our 2018 Credit Facility.

Contractual Obligations

Our contractual obligations at December 31, 2019 consisted of the following (in millions):

	Payments due by period				
	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
Finance lease obligations	$ 3.4	$ 1.6	$ 1.8	$ —	$ —
Operating lease obligations	55.5	10.3	17.1	12.4	15.7
Purchase obligations	54.4	52.3	2.1	—	—
Restructuring severance obligations	2.5	2.5	—	—	—
Debt obligations - principal *	56.8	2.5	5.0	49.3	—
Debt obligations - interest	6.3	1.6	2.9	1.8	—
Employee postretirement defined benefit plans	10.0	0.1	0.1	0.3	9.5
Uncertain tax positions **	3.6	3.6	—	—	—
	$ 192.5	$ 74.5	$ 29.0	$ 63.8	$ 25.2

* Debt obligations - principal represents the outstanding balance on our 2019 Credit Facility of $56.8 million at December 31, 2019, comprised of $8.0 million outstanding under the revolving credit facility and $48.8 million outstanding term loan principal. We periodically make payments and borrow on the revolving credit facility, and accordingly, we have included it in current liabilities in our consolidated balance sheet. However, we have reported the outstanding balance payment due in the table above in the "3-5 years" column based solely on the expiration date of the 2019 Credit Facility.

** 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 20 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 2019 Credit Facility or the 2020 Credit Facility, as applicable, will be sufficient to meet our anticipated cash needs for working capital, the pending ECI Merger and capital expenditures for at least twelve months. However, 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. However, it is difficult to predict future liquidity requirements with certainty, and our cash and available borrowings under the 2019 Credit Facility or the 2020 Credit Facility, as applicable, 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

Effective January 1, 2019, we adopted the Financial Accounting Standard Board's ("FASB") new standard on accounting for leases, ASC 842. ASC 842 replaced existing lease accounting rules with a comprehensive lease measurement and recognition standard and expanded disclosure requirements. ASC 842 requires lessees to recognize most leases on their balance sheets and eliminates the current GAAP requirement for an entity to use bright-line tests in determining lease classification.

We elected to use the alternative transition method, which allows entities to initially apply ASC 842 at the adoption date with no subsequent adjustments to prior period lease costs for comparability. We elected the package of practical expedients permitted under the transition guidance, which provided that a company need not reassess whether expired or existing contracts contained a lease, the lease classification of expired or existing leases, and the amount of initial direct costs for existing leases.

In connection with the adoption of ASC 842, we recorded additional lease assets of approximately $44 million and additional lease liabilities of approximately $48 million as of January 1, 2019. The difference between the additional lease assets and lease liabilities, net of the deferred tax impact, was due to the absorption of related balances into the right-of-use assets, such as deferred rent. The adoption of this standard had no impact on our consolidated statements of operations or of cash flows.

The FASB has issued the following accounting pronouncements, all of which became effective for the Company on January 1, 2019 and none of which had a material impact on the Company's consolidated financial statements:

In July 2018, the FASB issued ASU 2018-09, *Codification Improvements* (“ASU 2018-09”), which contains amendments to clarify, correct errors in or make minor improvements to the FASB codification. ASU 2018-09 makes improvements to multiple topics, including but not limited to comprehensive income, debt, income taxes related to both stock-based compensation and business combinations, fair value measurement and defined contribution benefit plans.

In June 2018, the FASB issued ASU 2018-07, *Compensation - Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting*, which expands the scope of Accounting Standards Codification ("ASC") 718, *Compensation - Stock Compensation* ("ASC 718"), to include all share-based payment arrangements related to the acquisition of goods and services from both nonemployees and employees. As a result, most of the guidance in ASC 718 associated with employee share-based payments, including most of its requirements related to classification and measurement, applies to nonemployee share-based payment arrangements.

In February 2018, the FASB issued ASU 2018-02, *Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income* ("ASU 2018-02"), which amends ASC 220, *Income Statement - Reporting Comprehensive Income*, to allow a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Act and requires entities to provide certain disclosures regarding stranded tax effects. We did not elect to reclassify the income tax effects of the Tax Act from accumulated other comprehensive income to accumulated deficit.

In October 2016, the FASB issued ASU 2016-16, *Income Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory*, which removes the prohibition in ASC 740, *Income Taxes*, against the immediate recognition of the current and deferred income tax effects of intra-entity transfers of assets other than inventory.

In addition, the FASB has issued the following accounting pronouncements, none of which we believe will have a material impact on our consolidated financial statements:

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. ASU 2018-15 was effective for us beginning January 1, 2020.

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. ASU 2018-14 was effective for us beginning January 1, 2020.

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*. ASU 2018-13 was effective for us beginning January 1, 2020 for both interim and annual reporting.

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. ASU 2019-04 and ASU 2019-05 are effective with the adoption of ASU 2016-13, which was effective for us beginning January 1, 2020 for both interim and annual reporting periods.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

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

At December 31, 2019, we had outstanding debt totaling approximately $57 million. A hypothetical movement of plus or minus 100 basis points in the interest rate of our outstanding debt would have changed our interest expense by $0.8 million for the year ended December 31, 2019.

Based on a hypothetical 10% adverse movement in all foreign currency exchange rates, our revenue for the year ended December 31, 2019 would have been adversely affected by approximately $8 million and our net loss for the year ended December 31, 2019 would have been adversely affected by approximately $4 million, although the actual effects may differ materially from this hypothetical analysis.

Item 8. Financial Statements and Supplementary Data

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, 2019 and 2018, the related consolidated statements of operations, comprehensive loss, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

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, 2019, 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 28 2020, 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 (ASC) Topic 606, “Revenue from Contracts with Customers,” using the modified retrospective adoption method on January 1, 2018 and adopted ASC 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.

/s/ Deloitte & Touche LLP

Dallas, Texas
February 28, 2020

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, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 44,643	$ 43,694
Marketable securities	—	7,284
Accounts receivable, net	192,706	187,853
Inventory	14,800	22,602
Other current assets	27,146	17,002
Total current assets	279,295	278,435
Property and equipment, net	28,976	27,042
Intangible assets, net	213,366	251,391
Goodwill	224,896	383,655
Deferred income taxes	4,959	9,152
Operating lease right-of-use assets	36,654	—
Other assets	26,762	7,484
	$ 814,908	$ 957,159
Liabilities and Stockholders' Equity		
Current liabilities:		
Current portion of long-term debt	$ 2,500	$ —
Revolving credit facility	8,000	55,000
Accounts payable	31,412	45,304
Accrued expenses and other	56,700	84,263
Operating lease liabilities	7,719	—
Deferred revenue	100,406	105,087
Total current liabilities	206,737	289,654
Long-term debt, net of current	45,995	—
Long-term debt, related party	—	24,100
Operating lease liabilities, net of current	37,202	—
Deferred revenue, net of current	20,482	17,572
Deferred income taxes	4,648	4,738
Other long-term liabilities	16,589	30,797
Total liabilities	331,653	366,861
Commitments and contingencies (Note 23)		
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, 110,471,995 shares issued and outstanding at December 31, 2019; 106,815,636 shares issued and outstanding at December 31, 2018	11	11
Additional paid-in capital	1,747,784	1,723,576
Accumulated deficit	(1,267,067)	(1,136,992)
Accumulated other comprehensive income	2,527	3,703
Total stockholders' equity	483,255	590,298
	$ 814,908	$ 957,159

See notes to the consolidated financial statements.

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

	Year ended December 31,		
	2019	2018	2017
Revenue:			
Product	$ 262,030	$ 279,014	$ 181,119
Service	301,081	298,891	148,823
Total revenue	563,111	577,905	329,942
Cost of revenue:			
Product	133,347	142,185	70,250
Service	112,680	127,388	58,196
Total cost of revenue	246,027	269,573	128,446
Gross profit	317,084	308,332	201,496
Operating expenses:			
Research and development	141,060	145,462	101,481
Sales and marketing	117,962	128,276	83,403
General and administrative	53,870	66,036	47,642
Impairment of goodwill	164,300	—	—
Acquisition- and integration-related	12,953	16,951	14,763
Restructuring and related	16,399	17,015	9,436
Total operating expenses	506,544	373,740	256,725
Loss from operations	(189,460)	(65,408)	(55,229)
Interest (expense) income, net	(3,877)	(4,230)	263
Other income (expense), net	70,444	(3,772)	1,274
Loss before income taxes	(122,893)	(73,410)	(53,692)
Income tax (provision) benefit	(7,182)	(3,400)	18,440
Net loss	$ (130,075)	$ (76,810)	$ (35,252)
Loss per share:			
Basic	$ (1.19)	$ (0.74)	$ (0.60)
Diluted	$ (1.19)	$ (0.74)	$ (0.60)
Shares used to compute loss per share:			
Basic	109,734	103,916	58,822
Diluted	109,734	103,916	58,822

See notes to the consolidated financial statements.

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

	Year ended December 31,		
	2019	**2018**	**2017**
Net loss	$ (130,075)	$ (76,810)	$ (35,252)
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	194	220	(1,940)
Unrealized gain on available-for-sale marketable securities, net of reclassification adjustments for realized amounts	590	45	146
Employee retirement benefits	(1,960)	369	(578)
Other comprehensive (loss) income, net of tax	(1,176)	634	(2,372)
Comprehensive loss, net of tax	$ (131,251)	$ (76,176)	$ (37,624)

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, 2017	**49,041,881**	**$ 49**	**$ 1,250,744**	**$ (1,037,174)**	**$ 5,503**	**$ 219,122**
Issuance of common stock in connection with employee stock purchase plan	249,621		1,252			1,252
Exercise of stock options	105,688		617			617
Vesting of restricted stock awards and units	2,160,553					—
Vesting of performance-based stock awards and units	145,357					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(807,952)		(7,523)			(7,523)
Shares issued as consideration in connection with acquisition of GENBAND	50,857,708	5	413,977			413,982
Stock-based compensation expense			25,657			25,657
Reclassification between Common stock and Additional paid-in capital to record change in par value of common stock		(44)	44			—
Other comprehensive loss					(2,434)	(2,434)
Net loss				(35,252)		(35,252)
Balances, December 31, 2017	**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 awards and units	1,278,062					—
Vesting of performance-based stock 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 acquisition of Edgewater Networks, Inc.	4,235,531	1	29,999			30,000
Assumption of equity awards in connection with 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**

See notes to the consolidated financial statements.

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

	Year ended December 31,		
	2019	**2018**	**2017**
Cash flows from operating activities:			
Net loss	$ (130,075)	$ (76,810)	$ (35,252)
Adjustments to reconcile net loss to cash flows provided by (used in) operating activities:			
Depreciation and amortization of property and equipment	11,949	11,200	8,486
Amortization of intangible assets	49,225	49,723	17,112
Stock-based compensation	12,601	11,072	25,657
Impairment of intangible assets and goodwill	164,300	—	5,471
Deferred income taxes	5,299	513	(20,361)
Reduction in deferred purchase consideration	(8,124)	—	—
Foreign currency exchange losses (gains)	1,090	4,611	(783)
Other	—	—	(557)
Changes in operating assets and liabilities:			
Accounts receivable	(3,936)	(13,017)	(30,759)
Inventory	7,776	993	5,786
Other operating assets	(17,489)	5,036	269
Accounts payable	(16,282)	(6,057)	13,415
Accrued expenses and other long-term liabilities	(18,538)	(13,422)	(4,263)
Deferred revenue	(2,111)	16,563	23,859
Net cash provided by (used in) operating activities	55,685	(9,595)	8,080
Cash flows from investing activities:			
Purchases of property and equipment	(10,824)	(7,907)	(3,999)
Business acquisitions, net of cash acquired	—	(46,389)	(42,951)
Purchases of marketable securities	—	—	(28,731)
Sales/maturities of marketable securities	7,295	18,919	96,112
Proceeds from the sale of intangible assets	—	—	576
Net cash (used in) provided by investing activities	(3,529)	(35,377)	21,007
Cash flows from financing activities:			
Borrowings under revolving line of credit	117,000	197,500	15,500
Principal payments on revolving line of credit	(164,000)	(162,500)	(13,500)
Proceeds from issuance of long-term debt	50,000	—	—
Principal payment of debt, related party	(24,716)	—	—
Principal payments of long-term debt	(1,250)	—	—
Payment of deferred purchase consideration	(21,876)	—	—
Principal payments of finance leases	(913)	(652)	(99)
Payment of debt issuance costs	(891)	(624)	(731)
Proceeds from the sale of common stock in connection with employee stock purchase plan	863	—	1,252
Proceeds from the exercise of stock options	235	73	617
Payment of tax withholding obligations related to net share settlements of restricted stock awards	(1,193)	(2,024)	(7,523)
Repurchase of common stock	(4,536)	—	—
Net cash (used in) provided by financing activities	(51,277)	31,773	(4,484)

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

	Year ended December 31,		
	2019	2018	2017
Effect of exchange rate changes on cash and cash equivalents	70	(180)	547
Net increase (decrease) in cash and cash equivalents	949	(13,379)	25,150
Cash and cash equivalents, beginning of year	43,694	57,073	31,923
Cash and cash equivalents, end of year	$ 44,643	$ 43,694	$ 57,073
Supplemental disclosure of cash flow information:			
Interest paid	$ 4,072	$ 2,367	$ 317
Income taxes paid	$ 4,665	$ 5,505	$ 2,290
Income tax refunds received	$ 1,757	$ 537	$ 274
Supplemental disclosure of non-cash investing activities:			
Capital expenditures incurred, but not yet paid	$ 2,566	$ 1,127	$ 1,043
Property and equipment acquired under finance leases	$ 1,442	$ 2,178	$ —
Business acquisition purchase consideration - common stock issued	$ 15,186	$ 30,000	$ 413,982
Business acquisition purchase consideration - deferred payments	$ 1,700	$ 30,000	$ —
Business acquisition purchase consideration - assumed equity awards	$ —	$ 747	$ —
Business acquisition purchase consideration - note issued to selling equityholders	$ —	$ —	$ 22,500
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	$ 7,422	$ 8,312	$ 20,515

See notes to the consolidated financial statements.

RIBBON COMMUNICATIONS INC.
Notes to Consolidated Financial Statements

(1) NATURE OF THE BUSINESS

Ribbon is a leading provider of next generation ("NextGen") software solutions to telecommunications, wireless and cable service providers and enterprises of all sizes across industry verticals. With over 1,000 customers around the globe, including some of the largest telecommunications service providers and enterprises in the world, Ribbon enables service providers and enterprises to modernize their communications networks through software and provide secure RTC solutions to their customers and employees. By securing and enabling reliable and scalable IP networks, Ribbon helps service providers and enterprises adopt the next generation of software-based virtualized and cloud communications technologies to drive new, incremental revenue, while protecting their existing revenue streams. Ribbon's software solutions provide a secure way for its customers to connect and leverage multivendor, multiprotocol communications systems and applications across their networks and the cloud, around the world and in a rapidly changing ecosystem of IP-enabled devices, such as smartphones and tablets. In addition, Ribbon's software solutions secure cloud-based delivery of UC solutions - both for service providers transforming to a cloud-based network and for enterprises using cloud-based UC. Ribbon sells its software solutions through both direct sales and indirect channels globally, leveraging the assistance of resellers, and provides ongoing support to its customers through a global services team with experience in design, deployment and maintenance of some of the world's largest software IP networks.

(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 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.

On October 27, 2017 (the "Merger Date"), Sonus Networks, Inc. ("Sonus") consummated an acquisition as specified in an Agreement and Plan of Merger (the “Merger Agreement”) with Solstice Sapphire Investments, Inc. ("NewCo") and certain of its wholly-owned subsidiaries, GENBAND Holdings Company, GENBAND Inc. and GENBAND II, Inc. (collectively, "GENBAND") pursuant to which, following a series of merger transactions (collectively, the "Merger"), Sonus and GENBAND each became a wholly-owned subsidiary of NewCo, with Sonus deemed the acquirer in the transaction for accounting purposes. Subsequently, on November 28, 2017, the Company changed its name from "Sonus Networks, Inc." to "Ribbon Communications Inc."

The consolidated financial statements of the Company represent the consolidated financial statements of Sonus, prior to the Merger Date, and the consolidated financial statements of Ribbon, on and after the Merger Date. The financial results of GENBAND are included in Ribbon's consolidated financial statements beginning on the Merger 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 and goodwill valuations, 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

Certain reclassifications, net affecting previously reported net loss, have been made to the previously issued financial statements to conform to the current period 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

Effective January 1, 2018, the Company adopted Accounting Standards Codification ("ASC") 606, *Revenue from Contracts with Customers* ("ASC 606" or the "New Revenue Standard") using the modified retrospective approach. As a result, the Company changed its accounting policy for revenue recognition, which is described below and in Note 14.

The Company derives revenue from two primary sources: products and services. Product revenue includes the Company's appliances and software that function together to deliver the products' essential functionality. Software and appliances 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 appliances 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. 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. The Company does not recognize software revenue related to the renewal of subscription software licenses earlier than the beginning of the subscription period. Appliance products are generally sold with software to provide the customer solution.

The Company offers warranties on its products. Certain of the Company's warranties are considered to be assurance-type in nature and do not cover anything beyond ensuring that the product is functioning as intended. Based on the guidance in ASC 606, 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 related to the support. 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. 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.

Financial Instruments

The carrying amounts of Ribbon's financial instruments approximate their fair values and include cash equivalents, investments, accounts receivable, borrowings under a revolving credit facility, accounts payable and long-term debt.

All investments in marketable securities are classified as available-for-sale and 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.

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.

Cash and Cash Equivalents

Cash equivalents are stated at fair value. Cash equivalents are liquid securities that have remaining maturities of three months or less at the date of purchase.

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.

Effective on the Merger Date, the Company began to record its foreign currency gains (losses) as a component of Other income (expense), net. The Company did not reclassify amounts previously recorded within General and administrative expenses as the amounts were not material to the consolidated results of the Company. The Company recognized net foreign currency losses of $1.1 million for the year ended December 31, 2019, $4.6 million for the year ended December 31, 2018 and $0.7 million for the year ended December 31, 2017.

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 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.

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

Intangible assets are primarily comprised of certain intangible assets arising from the Merger and the Edgewater Acquisition. These intangible assets include a combination 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 9 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.

The Company's annual testing for impairment of goodwill is completed as of November 30. The Company operates as a single operating segment with one reporting unit and consequently evaluates 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. The Company performed 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 recorded an impairment charge in the fourth quarter of 2019 of $164.3 million. The impairment charge is reported separately in the Company's consolidated statement of operations for the year ended December 31, 2019.

The Company performed its assessments for each of the years ended December 31, 2018 and 2017 and determined in each of those years 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, 2019 and 2018, including at the Company's annual testing date of November 30, 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.

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.

Concentrations of Credit Risk

The financial instruments that potentially subject Ribbon to concentrations of credit risk are cash, cash equivalents, investments and accounts receivable. The Company's cash equivalents and investments were managed by one financial institution at December 31, 2018. Historically, the Company has not experienced significant losses due to such bank depository concentration.

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 $0.5 million for the year ended December 31, 2019, $0.5 million for the year ended December 31, 2018 and $0.3 million for the year ended December 31, 2017.

Operating Segments

The Company operates in a single segment, as the chief operating decision maker makes decisions and assesses performance at the company level. Operating segments are identified as components of an enterprise about which separate discrete financial information is utilized for evaluation by the chief operating decision maker in making decisions regarding resource allocation and assessing performance. To date, the chief operating decision maker has made such decisions and assessed performance at the company level, as one segment. The Company's chief operating decision makers are its Interim Co-Presidents and Chief Executive Officers.

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.

Accounting for Leases

Effective January 1, 2019, the Company adopted the new standard on accounting for leases, ASC 842, *Leases* ("ASC 842"). ASC 842 replaced existing lease accounting rules with a comprehensive lease measurement and recognition standard and expanded disclosure requirements (see Note 17). ASC 842 requires lessees to recognize most leases on their balance sheets and eliminates the current GAAP requirement for an entity to use bright-line tests in determining lease classification.

The Company elected to use the alternative transition method, which allowed entities to initially apply ASC 842 at the adoption date with no subsequent adjustments to prior period lease costs for comparability. The Company elected the package of practical expedients permitted under the transition guidance, which provided that a company need not reassess whether expired or existing contracts contained a lease, the lease classification of expired or existing leases, and the amount of initial direct costs for existing leases.

In connection with the adoption of ASC 842, the Company recorded additional lease assets of $43.9 million and additional lease liabilities of $47.8 million as of January 1, 2019. The difference between the additional lease assets and lease liabilities, net of the deferred tax impact, was due to the absorption of related balances into the right-of-use assets, such as deferred rent. The adoption of this standard had no impact on the Company's consolidated statements of operations or cash flows.

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, 2019, with the exception of the Company's Irish subsidiary, as the Company does not plan to permanently reinvest these amounts outside the United States. The repatriation of the undistributed earnings would result in withholding taxes imposed on the repatriation. Consequently, the Company has recorded a tax liability of $4.8 million, primarily consisting of withholding and distribution taxes, relating to undistributed earnings from these subsidiaries as of December 31, 2019. Had the earnings of the Irish subsidiary been determined to not be permanently reinvested outside the U.S., no additional deferred tax liability would be required due to no withholding taxes or income tax expense being imposed on such repatriation.

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 on January 1, 2019 and none of which had a material impact on the Company's consolidated financial statements:

In July 2018, the FASB issued Accounting Standards Update ("ASU") 2018-09, *Codification Improvements* (“ASU 2018-09”), which contains amendments to clarify, correct errors in or make minor improvements to the FASB codification. ASU 2018-09 makes improvements to multiple topics, including but not limited to comprehensive income, debt, income taxes related to both stock-based compensation and business combinations, fair value measurement and defined contribution benefit plans.

In June 2018, the FASB issued ASU 2018-07, *Compensation - Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting*, which expands the scope of ASC 718, *Compensation - Stock Compensation* ("ASC 718"), to include all share-based payment arrangements related to the acquisition of goods and services from both nonemployees and employees. As a result, most of the guidance in ASC 718 associated with employee share-based payments, including most of its requirements related to classification and measurement, applies to nonemployee share-based payment arrangements.

In February 2018, the FASB issued ASU 2018-02, I*ncome Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income*, which amends ASC 220, *Income Statement - Reporting Comprehensive Income*, to allow a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act (the "Tax Act") and requires entities to provide certain disclosures regarding stranded tax effects. The Company did not elect to reclassify the income tax effects of the Tax Act from accumulated other comprehensive income to accumulated deficit.

In October 2016, the FASB issued ASU 2016-16, I*ncome Taxes (Topic 740): Intra-Entity Transfers of Assets Other Than Inventory*, which removes the prohibition in ASC 740, *Income Taxes*, against the immediate recognition of the current and deferred income tax effects of intra-entity transfers of assets other than inventory.

In addition, the FASB has issued the following accounting pronouncements, none of which the Company believes will have a material impact on its consolidated financial statements:

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. ASU 2018-15 was effective for the Company beginning January 1, 2020.

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. ASU 2018-14 was effective for the Company beginning January 1, 2020.

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.* ASU 2018-13 was effective for the Company beginning January 1, 2020 for both interim and annual reporting.

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. ASU 2019-04 and ASU 2019-05 are effective with the adoption of ASU 2016-13, which was effective for the Company beginning January 1, 2020 for both interim and annual reporting periods.

(3) BUSINESS ACQUISITIONS

Pending Merger

On November 14, 2019, Ribbon entered into an Agreement and Plan of Merger (the "ECI Merger Agreement") with Eclipse Communications Ltd., an indirect wholly-owned subsidiary of the Company ("Merger Sub"), Ribbon Communications Israel Ltd., ECI Telecom Group Ltd. ("ECI") and ECI Holding (Hungary) kft, pursuant to which Merger Sub will merge with and into ECI, with ECI surviving such merger as a wholly-owned subsidiary of Ribbon (the "ECI Merger").

The Board unanimously approved the ECI Merger Agreement and the transactions contemplated thereby. Ribbon's stockholders approved the issuance of 32.5 million shares of the Company's common stock (the "ECI Stock Consideration") as partial consideration in the ECI Merger.

As provided in the ECI Merger Agreement, at the time of the closing of the ECI Merger (the "Effective Time"), all equity securities of ECI issued and outstanding immediately prior to the Effective Time will be converted into the right to receive consideration consisting of $324 million in cash (the "ECI Cash Consideration") and ECI Stock Consideration, less the amount of indebtedness of ECI as of the Effective Time. ECI equityholders will also receive approximately $31 million from ECI's sale of real estate assets.

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 believes that the Anova Acquisition is reinforcing and extending 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, some or all of which could be issued subject to post-closing adjustments (the "Anova Deferred Consideration"). The Anova Deferred Consideration is 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 9).

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").

Edgewater is a market leader in Network Edge Orchestration for the small and medium enterprise and UC market. The Company believes that the acquisition of Edgewater will allow it 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. Pursuant to the Edgewater Merger Agreement and subject to the terms and conditions contained therein, Ribbon agreed to pay the Edgewater Selling Stakeholders an additional $30 million of cash, $15 million of which was to be paid 6 months from the closing date and the other $15 million of which 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"). The current portion of this deferred purchase consideration was included as a component of Accrued expenses and other, and the noncurrent portion was included as a component of Other long-term liabilities in the Company's consolidated balance sheet as of December 31, 2018.

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 income 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.

As of December 31, 2019, the valuation of acquired assets, identifiable intangible assets and certain assumed liabilities was final, as the Company finalized the valuation of the assets acquired and liabilities assumed 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 16)		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 9). 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.

GENBAND Merger

On October 27, 2017, Sonus consummated an acquisition as specified in the Merger Agreement with NewCo and GENBAND such that, following the Merger, each of Sonus and GENBAND became a wholly-owned subsidiary of NewCo, with Sonus deemed the acquirer in the transaction for accounting purposes. On November 28, 2017, the Company changed its name from "Sonus Networks, Inc." to "Ribbon Communications Inc."

Prior to the Merger, GENBAND was a Cayman Islands exempted company limited by shares that was formed on April 7, 2010. Through its wholly owned operating subsidiaries, GENBAND created rapid communications and applications for service providers, enterprises, independent software vendors, system integrators and developers globally. A majority of GENBAND's shares were held by JPMorgan Chase & Co. and managed by One Equity Partners ("OEP"). GENBAND shares were not listed on an exchange or quoted on any automated services, and there was no established trading market for GENBAND shares.

The Company believes that Sonus' and GENBAND's complementary products, solutions and strategies have positioned the combined company to deliver comprehensive solutions to service providers and enterprises migrating to a virtualized all-IP environment in an expanded customer and global footprint.

Pursuant to the Merger Agreement, NewCo issued 50.9 million shares of Sonus common stock to the GENBAND equity holders, with the number of shares issued in the aggregate to the GENBAND equity holders equal to the number of shares of Sonus common stock outstanding immediately prior to the closing date of the Merger, such that former stockholders of Sonus would own approximately 50%, and former shareholders of GENBAND would own approximately 50%, of the shares of NewCo common stock issued and outstanding immediately following the consummation of the Merger.

In addition, NewCo repaid GENBAND’s long-term debt, including both principal and unpaid interest, to a related party of GENBAND totaling $48.0 million and repaid GENBAND’s management fees due to an affiliate of OEP totaling $10.3 million. NewCo also issued a promissory note for $22.5 million to certain GENBAND equity holders (the "Promissory Note").

NewCo assumed the liability under GENBAND's Senior Secured Credit Agreement (the "GENBAND Credit Agreement") with Silicon Valley Bank ("SVB"), which had outstanding borrowings and letters of credit totaling $17.9 million and $2.9 million, respectively, at October 27, 2017. At October 27, 2017, the outstanding borrowings had an average interest rate of 4.67%.

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

As of December 31, 2018, the valuation of acquired assets, identifiable intangible assets and certain assumed liabilities was final, as the Company finalized the valuation of the assets acquired and liabilities assumed in the third quarter of 2018. A summary of the final allocation of the purchase consideration for GENBAND is as follows (in thousands):

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

Fair value of consideration transferred:		
Cash consideration:		
Repayment of GENBAND long-term debt and accrued interest, related party	$	47,973
Payment of GENBAND management fees due to majority shareholder		10,302
Less cash acquired		(15,324)
Net cash consideration		42,951
Fair value of Sonus stock issued		413,982
Promissory note issued to GENBAND equity holders		22,500
Fair value of total consideration	$	479,433

Fair value of assets acquired and liabilities assumed:		
Current assets, net of cash acquired	$	99,126
Property and equipment		16,770
Intangible assets:		
In-process research and development		5,600
Developed technology		129,000
Customer relationships		101,300
Trade names		900
Goodwill		285,825
Other noncurrent assets		6,732
Revolving credit facility		(17,930)
Deferred revenue		(32,390)
Other current liabilities		(80,023)
Deferred revenue, net of current		(6,804)
Other long-term liabilities		(28,673)
	$	479,433

The valuation of 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 took into consideration the Company's estimates of customer attrition, technology obsolescence and revenue growth projections. The Company will reclassify the in-process research and development intangible asset to a developed technology intangible asset in the period that the related product becomes generally available and will begin to record amortization expense for the developed technology intangible asset at that time. The Company is amortizing the identifiable intangible assets arising from the Merger in relation to the expected cash flows from the individual intangible assets over their respective useful lives, which have a weighted average life of 8.3 years (see Note 9). Goodwill resulting from the transaction is primarily due to expected synergies between the combined companies and is not deductible for tax purposes.

Pro Forma Results

The following unaudited pro forma information presents the condensed combined results of operations of Sonus and GENBAND for the year ended December 31, 2017 as if the Merger had been completed on January 1, 2016, with adjustments to give effect to pro forma events that are directly attributable to the Merger. These pro forma adjustments include a reduction of historical GENBAND revenue for the fair value adjustment related to acquired deferred revenue, an increase in amortization expense for the acquired identifiable intangible assets, a decrease in historical GENBAND interest expense reflecting the extinguishment of certain of GENBAND's debt as a result of the Merger, net of the interest expense recorded in connection with the promissory note issued to certain GENBAND equity holders as part of the purchase consideration and the elimination of revenue and costs related to sales transactions between Sonus and GENBAND. Pro forma adjustments also include the elimination of acquisition- and integration-related costs directly attributable to the acquisition and incremental stock-based compensation expense directly attributable to the acquisition from the year ended December 31, 2017.

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 Sonus and GENBAND. 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 Merger occurred at the beginning of the periods presented, nor are they intended to represent or be indicative of future results of operations (in thousands, except per share amounts):

	Year ended December 31, 2017
	(unaudited)
Revenue	$ 615,286
Net loss	$ (69,741)
Loss per share	$ (0.69)

Acquisition- and Integration-Related Expenses

Acquisition- and integration-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. 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, 2019 primarily related to the pending ECI Merger 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 Merger, with nominal amounts related to the acquisition of Edgewater and other acquisition-related activities. The amounts recorded in the year ended December 31, 2017 primarily related to the Merger, with a nominal amount related to the acquisition of Taqua.

The components of acquisition- and integration-related costs incurred in the years ended December 31, 2019, 2018 and 2017 were as follows (in thousands):

	Year ended December 31,		
	2019	2018	2017
Professional and services fees (acquisition-related)	$ 8,657	$ 7,627	$ 11,916
Management bonuses (acquisition-related)	—	1,972	931
Integration-related expenses	4,296	7,352	1,916
	$ 12,953	$ 16,951	$ 14,763

(4) 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 loss per share are as follows (in thousands):

	Year ended December 31,		
	2019	2018	2017
Weighted average shares outstanding—basic	109,734	103,916	58,822
Potential dilutive common shares	—	—	—
Weighted average shares outstanding—diluted	109,734	103,916	58,822

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

Options to purchase the Company's common stock, unvested shares of restricted stock and unvested shares underlying performance-based stock grants aggregating 4.6 million shares for the year ended December 31, 2019 have not been included in the computation of diluted loss per share because their effect would have been antidilutive. Options to purchase the Company's common stock, unvested shares of restricted stock, unvested shares underlying performance-based stock grants 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 for the year ended December 31, 2018 have not been included in the computation of diluted loss per share because their effect would have been antidilutive. Options to purchase the Company's common stock, unvested shares of restricted stock and unvested shares underlying performance-based stock grants aggregating 2.5 million shares for the year ended December 31, 2017 have not been included in the computation of diluted loss per share because their effect would have been antidilutive.

(5) CASH EQUIVALENTS AND INVESTMENTS

The Company invests in debt instruments, primarily U.S. government-backed, municipal and corporate obligations, which management believes to be high quality (investment grade) credit instruments.

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. In addition, the Company did not hold any cash equivalents at December 31, 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, 2018, the Company sold $12.5 million of its available-for-sale securities, which it used for acquisition-related payments in connection with the Edgewater Acquisition and to support integration-related and restructuring activities in connection with the Merger. During the year ended December 31, 2017, the Company sold $51.6 million of its available-for-sale securities, primarily to provide the cash consideration and other acquisition-related payments in connection with the Merger.

During the years ended December 31, 2019 and 2018, the Company recognized nominal gross gains and losses on the sales/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.

The amortized cost, gross unrealized gains and losses and fair value of the Company's cash equivalents and marketable securities at December 31, 2018 were comprised of the following (in thousands):

	December 31, 2018			
	Amortized cost	Unrealized gains	Unrealized losses	Fair value
Cash equivalents	$ 310	$ —	$ —	$ 310
Marketable securities				
U.S. government agency notes	$ 3,998	$ —	$ (9)	$ 3,989
Corporate debt securities	3,301	—	(6)	3,295
	$ 7,299	$ —	$ (15)	$ 7,284

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 following table shows the fair value of the Company's financial assets at December 31, 2018. These financial assets are comprised of the Company's available-for-sale debt securities and reported under the captions Cash and cash equivalents and Marketable securities in the consolidated balance sheets (in thousands):

		Fair value measurements at December 31, 2018 using:		
	Total carrying value at December 31, 2018	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Cash equivalents	$ 310	$ 310	$ —	$ —
Marketable securities				
U.S. government agency notes	$ 3,989	$ —	$ 3,989	$ —
Corporate debt securities	3,295	—	3,295	—
	$ 7,284	$ —	$ 7,284	$ —

The Company's marketable securities were 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.

(6) ACCOUNTS RECEIVABLE, NET

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

	December 31,	
	2019	2018
Accounts receivable	$ 193,619	$ 188,522
Allowance for doubtful accounts	(913)	(669)
Accounts receivable, net	$ 192,706	$ 187,853

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 (deferred revenue)	Write-offs	Balance at end of year
2019	$ 669	$ 738	$ 68	$ (562)	$ 913
2018	$ 73	$ 351	$ 620	$ (375)	$ 669
2017	$ 10	$ 154	$ (56)	$ (35)	$ 73

(7) INVENTORY

Inventory consisted of the following (in thousands):

	December 31,	
	2019	2018
On-hand final assemblies and finished goods inventories	$ 13,283	$ 19,879
Deferred cost of goods sold	2,441	3,798
	15,724	23,677
Less noncurrent portion (included in Other assets)	(924)	(1,075)
Current portion	$ 14,800	$ 22,602

(8) PROPERTY AND EQUIPMENT

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

		December 31,	
	Useful Life	2019	2018
Equipment	2-5 years	$ 82,737	$ 76,423
Software	2-5 years	27,939	24,707
Furniture and fixtures	3-5 years	1,283	1,490
Leasehold improvements	Shorter of the life of the lease or estimated useful life (1-5 years)	23,975	21,220
		135,934	123,840
Less accumulated depreciation and amortization		(106,958)	(96,798)
Property and equipment, net		$ 28,976	$ 27,042

The Company recorded depreciation and amortization expense related to property and equipment of $11.9 million for the year ended December 31, 2019, $11.2 million for the year ended December 31, 2018 and $8.5 million for the year ended December 31, 2017. During each of the years ended December 31, 2019, 2018 and 2017, 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,	
	2019	2018
Cost	$ 4,401	$ 2,979
Less accumulated depreciation	(1,981)	(875)
Property and equipment under finance leases, net	$ 2,420	$ 2,104

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

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

	December 31,	
	2019	2018
United States	$ 17,584	$ 17,862
Canada	4,768	4,076
Asia/Pacific	5,146	3,841
Europe	1,224	1,100
Other	254	163
	$ 28,976	$ 27,042

(9) INTANGIBLE ASSETS AND GOODWILL

The Company's intangible assets at December 31, 2019 and 2018 consisted of the following (in thousands):

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

December 31, 2018	Weighted average amortization period (years)	Cost	Accumulated amortization	Net carrying value
In-process research and development	*	$ 5,600	$ —	$ 5,600
Developed technology	6.91	182,880	63,187	119,693
Customer relationships	9.44	146,940	22,218	124,722
Trade names	5.20	2,000	624	1,376
Internal use software	3.00	730	730	—
	7.88	$ 338,150	$ 86,759	$ 251,391

* 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.

Amortization expense for intangible assets for the years ended December 31, 2019, 2018 and 2017 was as follows (in thousands):

	Year ended December 31,			
	2019	2018	2017	Statement of operations classification
Developed technology	$ 37,573	$ 38,976	$ 18,358	Cost of revenue - product
Customer relationships	11,132	10,203	4,145	Sales and marketing
Trade names	520	544	80	Sales and marketing
	$ 49,225	$ 49,723	$ 22,583	

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

In connection with the preparation of its financial statements for the fourth quarter of 2017, the Company reviewed its intangible assets and other long-lived assets for impairment indicators. The Company determined that a triggering event had occurred relative to one of its developed technology intangible assets that had been previously acquired. During 2017, the Company discontinued its ongoing development of this technology and determined that there were no alternative uses of the technology within either its existing or future product lines. As a result, the Company recorded an impairment charge of $5.5 million to write down the carrying value of the asset to zero. This expense is included as a component of Cost of revenue - product in the table above and in the Company's consolidated statement of operations for the year ended December 31, 2017.

Estimated future amortization expense for the Company's intangible assets at December 31, 2019 was as follows (in thousands):

Years ending December 31,		
2020	$	48,952
2021		43,495
2022		35,092
2023		27,271
2024		20,201
Thereafter		38,355
	$	213,366

Goodwill is recorded when the consideration for an acquisition exceeds the fair value of net tangible and identifiable intangible assets acquired. The Company's annual testing for impairment of goodwill is completed as of November 30. The Company operates as a single operating segment with one reporting unit and consequently evaluates 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 changes in the carrying value of the Company's goodwill in the years ended December 31, 2019 and 2018 were as follows (in thousands):

	Year ended December 31,	
	2019	2018
Balance at January 1		
Goodwill	$ 386,761	$ 338,822
Accumulated impairment losses	(3,106)	(3,106)
	383,655	335,716
Acquisition of Anova	5,541	—
Acquisition of Edgewater	—	48,053
Write-off of goodwill attributable to dissolved subsidiary	—	(114)
Impairment of goodwill	(164,300)	—
Balance at December 31	$ 224,896	$ 383,655

The components of goodwill at December 31, 2019 and 2018 were as follows (in thousands):

	December 31,	
	2019	2018
Goodwill	$ 392,302	$ 386,761
Accumulated impairment losses	(167,406)	(3,106)
	$ 224,896	$ 383,655

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

(10) ACCRUED EXPENSES AND OTHER

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

	December 31,	
	2019	2018
Employee compensation and related costs	$ 27,166	$ 42,852
Professional fees	13,331	7,994
Deferred purchase consideration - business acquisitions	1,700	15,000
Other	14,503	18,417
	$ 56,700	$ 84,263

(11) RESTRUCTURING AND FACILITIES CONSOLIDATION INITIATIVES

The Company recorded restructuring and related expense aggregating $16.4 million in the year ended December 31, 2019, $17.0 million in the year ended December 31, 2018 and $9.4 million in the year ended December 31, 2017. 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.

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

Severance and related costs	$ 11,179
Variable and other facilities-related costs	1,528
Accelerated amortization of lease assets due to cease-use	3,692
	$ 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 years ended December 31, 2018 and 2017 were as follows (in thousands):

	Year ended December 31,	
	2018	2017
Severance and related costs	15,217	8,925
Facilities	1,798	511
	$ 17,015	$ 9,436

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. In connection with this initiative, the Company expects to reduce its focus on hardware and appliance-based development over time and to increase its development focus on software virtualization, functional simplicity and important customer requirements. 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 intends to substantially consolidate 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 by the end of 2020.

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

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. The $3.7 million of accelerated rent amortization recorded in 2019 that is included as a component of restructuring and related expense is not included in the table 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 sheet at December 31, 2019, both current and noncurrent (see Note 16). The Company may incur additional future expense if it is unable to sublease other locations included in the Facilities Initiative.

A summary of the 2019 Restructuring Initiative accrual activity, excluding the accelerated amortization of lease assets, for the year ended December 31, 2019 is as follows (in thousands):

	Balance at January 1, 2019	Initiatives charged to expense	Cash payments	Balance at December 31, 2019
Severance	$ —	$ 6,103	$ (3,993)	2,110
Facilities	—	1,372	(381)	991
	$ —	$ 7,475	$ (4,374)	$ 3,101

Merger Restructuring Initiative

In connection with the Merger, the Company's management approved 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 additional employees and $1.4 million for redundant facilities in the Czech Republic, Canada and the U.S., and $8.5 million of restructuring and related expense in 2017 for severance and related costs for approximately 120 employees. The Merger Restructuring Initiative is substantially complete, and the Company anticipates it will record nominal future expense, if any, in connection with this initiative. 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. The Company expects that the amount accrued at December 31, 2019 for severance will be paid by the end of the first half of 2020.

Summaries of the Merger Restructuring Initiative accrual activity for the years ended December 31, 2019 and 2018 are as follows (in thousands):

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

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

Year ended December 31, 2018	Balance at January 1, 2018	Initiatives charged to expense	Adjustments for changes in estimate	Cash payments	Balance at December 31, 2018
Severance	$ 7,595	$ 14,735	$ (5)	$ (20,415)	$ 1,910
Facilities	—	1,399	—	(628)	771
	$ 7,595	$ 16,134	$ (5)	$ (21,043)	$ 2,681

Assumed Restructuring Initiative

The Company assumed GENBAND's previously recorded restructuring liability, totaling $4.1 million, on the 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 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, primarily changes in negotiated severance to employees in certain international locations and changes in estimated sublease income for restructured facilities. The GENBAND Restructuring Initiative is complete, and the Company does not expect to record future expense in connection with this initiative. 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.

Summaries of the GENBAND Restructuring Initiative accrual activity for the years ended December 31, 2019 and 2018 are as follows (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)	$ —

Year ended December 31, 2018	Balance at January 1, 2018	Adjustments for changes in estimate	Cash payments	Balance at December 31, 2018
Severance	$ 1,916	$ 487	$ (2,403)	$ —
Facilities	205	399	(487)	117
	$ 2,121	$ 886	$ (2,890)	$ 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, and accordingly, no additional expense will be recorded in connection with this initiative.

In connection with the 2016 Restructuring Initiative, the Company recorded $0.5 million of restructuring expense in the year ended December 31, 2017, including adjustments for changes in estimated costs, comprised of $0.4 million for severance and related costs and $0.1 million related to the Company's Rochester Facility.

Summaries of the 2016 Restructuring Initiative accrual activity for the years ended December 31, 2019 and 2018 are as follows (in thousands):

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

Year ended December 31, 2018	Balance at January 1, 2018	Cash payments	Balance at December 31, 2018
Facilities	$ 95	$ (37)	$ 58

Taqua Restructuring Initiative

In connection with the acquisition of Taqua, the Company's management approved a restructuring plan in the third quarter of 2016 to eliminate certain redundant positions within the combined companies. On October 24, 2016, the Audit Committee of the Board of Directors of the Company approved a broader Taqua restructuring plan related to headcount and redundant facilities (both restructuring plans, the "Taqua Restructuring Initiative"). The Company recorded $1.8 million of restructuring and related expense in the aggregate in connection with this initiative, comprised of $1.2 million for severance and related costs and $0.6 million related to the elimination of redundant facilities, including adjustments recorded for changes in cost estimates for the planned restructuring activities. Of this amount, $0.7 million was recorded in 2017, comprised of $0.2 million for severance and related costs and $0.5 million related to redundant facilities. The actions under the Taqua Restructuring Initiative have been completed and accordingly, no additional expense will be recorded in connection with this initiative. 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.

Summaries of the Taqua Restructuring Initiative accrual activity for the years ended December 31, 2019 and 2018 are as follows (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	$ 33	$ (33)	$ —

Year ended December 31, 2018	Balance at January 1, 2018	Cash payments	Balance at December 31, 2018
Facilities	$ 365	$ (332)	$ 33

Balance Sheet Classification

The current portions of accrued restructuring are included as a component of Accrued expenses in the consolidated balance sheets. The long-term portions of accrued restructuring are included as a component of Other long-term liabilities in the consolidated balance sheets. The long-term portions of accrued restructuring were $0.9 million at December 31, 2019 and $0.5 million at December 31, 2018. The amount recorded as long-term at December 31, 2018 represented future lease payments on restructured facilities.

(12) DEBT

Assumed Senior Secured Credit Agreement

On the Merger Date and in connection with the Merger, the Company assumed the GENBAND Credit Agreement with SVB, which had outstanding borrowings and letters of credit totaling $17.9 million and $2.9 million, respectively, and an average interest rate of 4.67%. GENBAND had entered into the GENBAND Credit Agreement with SVB effective July 1, 2016, with two of its operating subsidiaries as borrowers and GENBAND as the guarantor. The GENBAND Credit Agreement had a maturity date of July 1, 2019 and provided for revolving loans, including letters of credit and swingline loans, not to exceed $50 million in total, with potential further increases of $75 million available for a total revolving line of credit of up to $125 million. The GENBAND Credit Agreement was superseded by a Senior Secured Credit Facilities Credit Agreement (the "2017 Credit Facility"), which was entered into on December 21, 2017 and is discussed below.

Senior Secured Credit Facility

On December 21, 2017, the Company entered into the 2017 Credit Facility by and among the Company, as a guarantor, Sonus Networks, Inc., as the borrower (“Borrower”), SVB, as administrative agent (in such capacity, the “Administrative Agent”), issuing lender, swingline lender and lead arranger and the lenders party thereto (each referred to individually as a “Lender”, and collectively, the “Lenders”), which refinanced the GENBAND Credit Agreement. The 2017 Credit Facility included $100 million of commitments, the full amount of which was available for revolving loans, a $15 million sublimit that was available for letters of credit and a $15 million sublimit that was available for swingline loans. The 2017 Credit Facility contained procedures for additional financial institutions to become lenders or for any existing lender to increase its commitment under the facility, subject to an available increase of $50 million for all incremental commitments under the 2017 Credit Facility. On June 24, 2018, the Company amended the 2017 Credit Facility (the "2018 Credit Facility") to, among other things, permit the Edgewater Acquisition and related transactions.

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 Company was in compliance with all covenants of the 2018 Credit Facility as of December 31, 2018.

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.

At December 31, 2018, the Company had an outstanding debt balance of $55.0 million at a weighted average interest rate of 5.96% and $2.7 million of outstanding letters of credit at an interest rate of 1.75% under the 2018 Credit Facility. The 2018 Credit Facility was superseded by a Senior Secured Credit Facilities Credit Agreement (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 the 2019 Credit Facility, which provides 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 includes 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 is scheduled to mature in April 2024. At December 31, 2019, the Company had an outstanding term loan debt balance of $48.8 million at an interest rate 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 are 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 is secured by first-priority liens on substantially all of the assets of the Borrower and the Guarantors, including the Company.

The 2019 Credit Facility requires periodic interest payments on any outstanding borrowings under the facility. The Borrower may 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 bear 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 varies depending on the Company’s consolidated leverage ratio (as defined in the 2019 Credit Facility). The base rate and the LIBOR rate are each subject to a zero percent floor.

The 2019 Credit Facility requires 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 are 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 contains various covenants that, among other restrictions, limit 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 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 a borrower occurs, all obligations under the 2019 Credit Facility will immediately become due and payable. If any other event of default exists under the 2019 Credit Facility, the lenders may 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 exists under the 2019 Credit Facility, the lenders may commence foreclosure or other actions against the collateral.

If any default exists under the 2019 Credit Facility, or if the Borrower is unable to make any of the representations and warranties as stated in the 2019 Credit Facility at the applicable time, the Borrower will 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 a material adverse effect on the Borrower’s liquidity and working capital.

Promissory Note

In connection with the 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. 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 occurred under the Promissory Note, the payees could declare 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. Interest that was not paid on the interest payment date would increase the principal amount of the Promissory Note. 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, 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.

(13) LONG-TERM LIABILITIES

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

	December 31,	
	2019	2018
Finance lease obligations	$ 3,149	$ 2,363
Deferred rent	—	3,039
Restructuring	3,510	979
Pension obligations	9,954	7,006
Taxes payable	1,991	1,818
Deferred purchase consideration	—	30,000
Other	1,683	2,425
	20,287	47,630
Current portion	(3,698)	(16,833)
Long-term liabilities, net of current portion	$ 16,589	$ 30,797

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

(14) REVENUE RECOGNITION

Effective January 1, 2018, the Company adopted the New Revenue Standard using the modified retrospective option and identified the necessary changes to its policies, processes, systems and controls. Under the modified retrospective method, the Company is applying the New Revenue Standard to all contracts not yet completed as of January 1, 2018, recognizing in beginning Accumulated deficit an adjustment for the cumulative effect of the change and providing additional disclosures comparing results to those as if the Company was still following the previous accounting standards. Under ASC 605, *Revenue Recognition* ("ASC 605"), the Company concluded it did not have vendor-specific objective evidence of selling price ("VSOE") for certain elements in software bundled arrangements, which resulted in revenue being recognized ratably over the longest performance period. Additionally, under ASC 606 for arrangements with certain customers that include acceptance criteria, revenue is recognized when the customer obtains control, as the Company believes acceptance is perfunctory. Under ASC 605, revenue was deferred until acceptance was received. The Company is also capitalizing incremental commission fees as a result of obtaining contracts and will amortize the asset based on the transfer of services to which the asset relates, which is approximately five years. The cumulative effect of capitalizing commission fees was not material at January 1, 2018. In connection with the adoption of ASC 606, as of January 1, 2018, the Company recorded an adjustment to decrease Accumulated deficit by $12.2 million (net of tax, which was $0 due to the full valuation allowance).

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
Appliances	When control of the appliance 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

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

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, 2019, 2018 and 2017 was disaggregated geographically as follows:

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
Japan	13,065	11,692	5,842	30,599
Other Asia Pacific	17,552	16,106	4,879	38,537
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
Japan	23,108	11,234	5,069	39,411
Other Asia Pacific	30,575	12,321	4,358	47,254
Other	17,988	31,273	7,872	57,133
	$ 279,014	$ 233,966	$ 64,925	$ 577,905

Year ended December 31, 2017	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 121,121	$ 75,040	$ 22,896	$ 219,057
Europe, Middle East and Africa	23,352	17,471	3,742	44,565
Japan	10,252	10,282	3,855	24,389
Other Asia Pacific	14,693	5,901	1,952	22,546
Other	11,701	6,041	1,643	19,385
	$ 181,119	$ 114,735	$ 34,088	$ 329,942

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, 2019, 2018 and 2017 was as follows (in thousands):

	Year ended December 31,		
	2019	2018	2017
Indirect sales through channel program	$ 94,639	$ 69,232	$ 43,138
Direct sales	167,391	209,782	137,981
	$ 262,030	$ 279,014	$ 181,119

The Company's product revenue from sales to enterprise customers and from sales to service provider customers for the years ended December 31, 2019, 2018 and 2017 was as follows (in thousands):

	Year ended December 31,		
	2019	2018	2017
Sales to enterprise customers	$ 70,548	$ 57,534	$ 35,592
Sales to service provider customers	191,482	221,480	145,527
	$ 262,030	$ 279,014	$ 181,119

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, 2019 and 2018 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, 2019 and 2018 were as follows (in thousands):

	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

	Accounts receivable	Unbilled accounts receivable	Deferred revenue (current)	Deferred revenue (long-term)
Balance at January 1, 2018	$ 149,122	$ 16,034	$ 100,571	$ 14,184
Increase (decrease), net	25,188	(2,491)	4,516	3,388
Balance at December 31, 2018	$ 174,310	$ 13,543	$ 105,087	$ 17,572

The Company recognized approximately $94 million of revenue in the year ended December 31, 2019 that was recorded as deferred revenue at December 31, 2018 and approximately $84 million of revenue in the year ended December 31, 2018 that was recorded as deferred revenue at December 31, 2017. Of the Company's deferred revenue reported as long-term in its consolidated balance sheet at December 31, 2019, the Company expects that approximately $13 million will be recognized as revenue in 2021, approximately $4 million will be recognized as revenue in 2022 and approximately $3 million will be recognized as revenue in 2023 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, 2019 and 2018, the Company had $3.6 million and $2.7 million, respectively, of deferred sales commissions capitalized.

Adoption of ASC 606

Under the modified retrospective method, the Company applied ASC 606 to those contracts that were not completed as of January 1, 2018. Results for reporting periods beginning January 1, 2018 are presented under ASC 606, and prior period amounts have not been adjusted and are reported in accordance with the Company's historical accounting treatment under ASC 605.

The Company recorded a net reduction to Accumulated deficit of $12.2 million (net of tax, which was $0 due to the full valuation allowance) at January 1, 2018 due to the cumulative impact of adopting ASC 606. Had the Company continued to recognize revenue under ASC 605, the Company would have recognized approximately $16 million less revenue in the year ended December 31, 2018. Incremental costs that would have been recognized had the Company continued to recognize revenue under ASC 605 would not have been material to the Company's consolidated results of operations.

(15) 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. At December 31, 2019, the Company had $70.5 million remaining under the Repurchase Program for future repurchases.

The Company had previously implemented a stock repurchase program (the "Sonus Repurchase Program"), which Ribbon did not assume in connection with the Merger. The Company did not repurchase any shares under the Sonus Repurchase Program during the year ended December 31, 2017.

(16) 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. Under the 2019 Plan, the Company may grant awards up to 7.0 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, 2019, there were 7.1 million shares available for future issuance under the 2019 Plan.

2007 Plan

The Company's 2007 Plan provides 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 (the "Edgewater Plan") for all outstanding options as of the Edgewater Acquisition Date (the "Edgewater Options"). The Edgewater Options were converted to Ribbon stock options (the "Ribbon Replacement Options") using a conversion factor of 0.17, which was calculated based on the acquisition consideration of $1.20 per share of Edgewater common stock divided by the weighted average of the closing price of Ribbon common stock for the ten consecutive days ending with the trading day that preceded the Edgewater Acquisition Date. This conversion factor was also used to convert the exercise prices of the Edgewater Options to Ribbon Replacement Option exercise prices. The Ribbon Replacement Options are vesting under the same schedules as the respective Edgewater Options.

The fair values of the Edgewater Options assumed 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 Edgewater Options. The fair value of the Ribbon Replacement Options attributable to future service totaled $1.0 million, which is being recognized over a weighted average period of approximately two years.

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, 2019 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, 2019 there were no shares available for future issuance under the 2008 Plan.

Treatment of Equity Awards in Connection with the Merger

In connection with the Merger, the Company accelerated the vesting of all then-outstanding stock options and certain then-outstanding full value awards on the Merger Date. In addition, the vesting schedules of certain remaining unvested full value awards were adjusted. Such vesting and adjustments are described below:

Stock options - each stock option outstanding as of five business days prior to the Merger Date became vested in full as of that date (to the extent not previously vested), and the holders of such stock options were permitted to exercise their stock options from October 20, 2017 through October 24, 2017, after which date all remaining stock options, with certain exceptions, were canceled. The Company accelerated the vesting of 0.3 million stock options and subsequently canceled 4.5 million vested unexercised stock options in connection with this transaction. Any stock options granted under the 2008 Plan and 2012 Plan were not canceled, as these plans do not permit such cancellations. These stock options continue to be outstanding until they are either exercised or expire.

RSAs and RSUs - as prescribed by the Company's 2007 Plan, any unvested RSAs and RSUs that were scheduled to vest within one year from the Merger Date vested in full as of the Merger Date. The vesting schedules of the remaining unvested RSAs and RSUs were then accelerated by one year. Certain executives had specific terms and conditions related to their RSAs detailed in their employment agreements or amendments thereto (the "employment terms"). The accelerated vesting of and future vesting schedule adjustments to the RSAs held by these individuals were completed in accordance with their individual employment terms. In accordance with the terms of their RSA grants, unvested RSAs held by the then-current members of the Board were accelerated on a pro rata basis based on the amount of time the unvested RSAs were outstanding compared to the originally scheduled vesting date. Unvested PSUs granted to the Company's then-current President and Chief Executive Officer, who separated from the Company effective December 13, 2017 (the "Former CEO"), were converted to RSAs in accordance with his employment terms; certain of those converted grants were accelerated, and the remaining RSAs continued to vest according to their terms, but with the elimination of any required satisfaction of the performance metrics associated with the awards when they were originally granted as PSUs. In total, the Company accelerated the vesting of and released 1.1 million RSAs and approximately 36,000 RSUs in connection with the Merger.

PSUs - any unvested PSUs were accelerated in accordance with the employment agreement of each individual PSU holder. The remaining unvested units would continue to vest according to their terms, with the exception of the PSU grants held by the Former CEO, as discussed above. The Company accelerated the vesting of and released approximately 98,000 PSUs in connection with the Merger.

Executive Equity Arrangements

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, ranging from 10% to 50% (the "Elected Percentage") 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” and such program, the “Stock Bonus Election Program”). 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. Any executive who elected to receive a portion of his or her 2018 Bonus in stock would also receive an uplift of 20% of the value of the 2018 Bonus Shares in additional shares of the Company’s common stock (the “Uplift Shares”) with the exception of the Company’s Chief Executive Officer and his senior leadership team. Under the Stock Bonus Election Program, the amount of the 2018 Bonus, if any, for each executive was determined by the Compensation Committee of the Board (the "Compensation Committee").

The number of shares earned by each of the 23 participants in the Stock Bonus Election Program was calculated by multiplying each participant's 2018 Bonus by the applicable Elected Percentage (plus the amount attributable to Uplift Shares, if applicable) and dividing the resulting amount by $4.97, the closing price of the Company’s common stock on March 8, 2019, the date of the company-wide cash bonus payments. The Company granted 198,949 shares in the aggregate in connection with the 2018 Bonus Shares on March 15, 2019, and such shares were fully vested on the date of grant. However, notwithstanding that each such share of common stock was fully vested, each participant in the Stock Bonus Election Program was contractually restricted from trading the 2018 Bonus Shares for five months after the date of grant. Both the grant and vesting of the 2018 Bonus Shares are included in the RSU table below.

The Company determined that the grant date criteria for the 2018 Bonus Shares and Uplift 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 and Uplift Shares. This liability was reclassified to equity at the time the shares were granted.

Performance-Based Stock Grants

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

2019 PSU Grants. 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").

Each executive's Performance PSU grant is comprised of three consecutive fiscal year performance periods from 2019 through 2021 (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 vest for each Fiscal Year Performance Period 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"). In the third quarter of 2019, the Company adjusted the 2019 Performance PSU goals to reflect the changes to the Company's calculation of certain metrics. There was no incremental expense in connection with this modification. The Company's achievement of the 2019 Fiscal Year Performance Conditions (and the number of shares of Company common stock to vest as a result thereof) will be measured on a linear sliding scale in relation to specific threshold, target and stretch performance conditions. The Company is recording stock-based compensation expense for the Performance PSUs based on its assessment of the probability that each performance condition will be achieved and the level, if any, of such achievement. As of December 31, 2019, the Company determined that the grant date criteria for the 2020 and 2021 Fiscal Year Performance Periods had not been met, as the 2020 and 2021 Fiscal Year Performance Conditions had not been established by the Company. Accordingly, the stock-based compensation expense recorded in the year ended December 31, 2019 in connection with the Performance PSUs is related only to those PSUs with 2019 Fiscal Year Performance Conditions. The Compensation Committee will determine 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 Performance PSUs, such number of shares will become fixed and the unamortized expense will be recorded through the remainder of the service period that ends on March 15, 2022, at which time the total Performance PSUs earned, if any, will vest, pending each executive's continued employment with the Company through that date. The number of shares of common stock to be achieved upon vesting of the Performance PSUs 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, which will end on December 31, 2021 (the "Market Performance Period"). The number of shares subject to the Market PSUs that will vest, if any, on March 15, 2022, 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 same Market Performance Period, measured by the Compensation Committee after the Market Performance Period ends. The shares determined to be earned will vest on March 15, 2022, pending each executive's continued employment with the Company through that date. The number of shares of common stock to be achieved upon vesting of the Market PSUs will in no event exceed 200% of the Market PSUs. Shares subject to the Market PSUs that fail to be earned will be forfeited.

2018 PSU Grant. 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. In the year ended December 31, 2018, the Company recorded stock-based compensation expense for the 2018 PSUs based on its assessment of the probability that each performance condition would be achieved and the level, if any, of such achievement. The Company recorded $0.3 million of stock-based compensation expense in the year ended December 31, 2018 in connection with the 2018 PSUs. In February 2019, the Compensation Committee determined that the performance metrics for one-half of the 2018 PSUs had been achieved at the 106.49% achievement level and one-half of the 2018 PSUs had been achieved at the 150% level, for a total of 250,075 shares earned. However, in April 2019, the Compensation Committee subsequently determined that the performance metrics for the entire 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 Mr. Hobbs' 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 (see "Accelerated Vesting of Unvested Stock Units Held by Mr. Hobbs" below).

2017 PSU Grants. On March 31, 2017, the Company granted an aggregate of 165,000 PSUs with both market and service conditions to five of its executives (the "2017 PSUs"). The terms of each PSU grant were such that up to one-third of the shares subject to the respective PSU grant would vest, if at all, on each of the respective first, second and third anniversaries of the date of grant, depending on the Company's TSR compared with the TSR of the companies included in the Nasdaq Telecommunications Index for the same fiscal year, measured by the Compensation Committee after each of the fiscal years as defined by each grant (each, a "Performance Period"). The shares determined to be earned would vest on the anniversary of the grant date following each Performance Period. Shares subject to the PSUs that failed to be earned would be forfeited. In March 2018, the Compensation Committee determined that the performance metrics for the 2017 PSUs for the 2017 Performance Period had been achieved at the 130% level and accordingly, 33,584 shares in the aggregate were released to the three remaining executives holding such outstanding grants, comprised of 25,834 shares, representing the 100% achievement of target, granted on March 31, 2017, and 7,750 shares, representing the 30% achievement over target, granted on March 31, 2018. In February 2019, the Compensation Committee determined that the performance metrics for the 2017 PSUs for the 2018 Performance Period had been achieved at the 61.4% level and accordingly, 9,464 shares were released to the three remaining executives holding such outstanding grants on March 31, 2019. The shares that failed to be earned for the 2018 Performance Period, aggregating 5,950 shares, were forfeited. Accordingly, at December 31, 2019, there were no remaining unvested 2017 PSUs outstanding. The release and forfeiture of the shares related to the 2018 Performance Period are included in the PSU table below.

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.

Accelerated Vesting of Unvested Stock Units Held by Mr. Hobbs. On November 13, 2019, the Company announced that, effective that date, Mr. Hobbs was no longer serving as the President and Chief Executive Officer of Ribbon, and, also on and effective November 13, 2019, the Board appointed Steven Bruny, the Company's Executive Vice President, Global Sales & Services, and Kevin Riley, the Company's Executive Vice President, Advanced R&D and Chief Technology Officer, as Interim Co-Presidents and Chief Executive Officers, to assume the duties of the Company's President and Chief Executive Officer while the Board searched for a permanent successor to Mr. Hobbs. Mr. Hobbs resigned his position as a member of the Board effective December 27, 2019 and separated from the Company effective December 31, 2019. In connection with his separation from the Company and in accordance with the terms of his employment agreement with the Company, the vesting of certain of

Mr. Hobbs' RSUs and PSUs were accelerated, some of which were released on January 30, 2020, with certain other PSUs, if any are earned, scheduled for release no later than December 15, 2020.

Stock Options

Stock options granted under the 2019 Plan expire ten years from the date of grant. Outstanding stock options granted under the Edgewater Plan expire ten years from the date of grant. Outstanding stock options granted under the 2008 Plan expire either seven or ten years from the date of grant. Outstanding stock options granted under the 2012 Plan expire ten years from the date of grant. There were no stock options outstanding under either the 2019 Plan or the 2007 Plan at December 31, 2019. 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, 2019 was as follows:

	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (years)	Aggregate Intrinsic Value (in thousands)
Outstanding at January 1, 2019	582,061	$ 9.01		
Granted	—	$ —		
Exercised	(127,334)	$ 1.85		
Forfeited	(38,666)	$ 2.55		
Expired	(118,937)	$ 12.43		
Outstanding at December 31, 2019	297,124	$ 11.55	4.95	$ 122
Vested or expected to vest at December 31, 2019	293,782	$ 11.65	4.92	$ 119
Exercisable at December 31, 2019	260,152	$ 12.89	4.59	$ 85

The Company did not grant stock options during the years ended December 31, 2019 and 2018. The grant date fair values of stock options granted in the year ended December 31, 2017 were estimated using the Black-Scholes valuation model with the following assumptions:

Risk-free interest rate	1.22% - 1.95%
Expected dividends	—
Weighted average volatility	51.1%
Expected life (years)	5.0

The risk-free interest rate used is the average U.S. Treasury Constant Maturities Rate for the expected life of the award. The expected dividend yield of zero is based on the fact that the Company has never paid dividends and has no present intention to pay cash dividends. The expected life for stock options is based on a combination of the Company's historical option patterns and expectations of future employee actions.

The weighted average grant-date fair value of options granted for the year ended December 31, 2017 was $3.05.

The total intrinsic values of options exercised were $0.5 million for the year ended December 31, 2019, approximately $39,000 for the year ended December 31, 2018 and $0.2 million for the year ended December 31, 2017.

The Company received cash from option exercises of $0.2 million in the year ended December 31, 2019, $0.1 million in the year ended December 31, 2018 and $0.6 million in the year ended December 31, 2017.

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, 2019 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2019	1,508,011	$ 6.90
Granted	—	$ —
Vested	(967,291)	$ 6.90
Forfeited	(52,744)	$ 7.04
Unvested balance at December 31, 2019	487,976	$ 6.87

The activity related to the Company's RSUs for the year ended December 31, 2019 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2019	636,300	$ 6.52
Granted	2,828,832	$ 4.98
Vested	(537,416)	$ 6.04
Forfeited	(137,656)	$ 5.35
Unvested balance at December 31, 2019	2,790,060	$ 5.11

The total grant date fair value of vested restricted stock grant shares was $9.9 million in the year ended December 31, 2019, $9.7 million in the year ended December 31, 2018 and $19.1 million in the year ended December 31, 2017.

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, 2019 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2019	210,416	$ 5.77
Granted	872,073	$ 6.03
Vested	(9,466)	$ 8.55
Forfeited	(5,950)	$ 8.55
Unvested balance at December 31, 2019	1,067,073	$ 5.94

The total grant date fair value of vested performance-based stock grant shares was $0.1 million in the year ended December 31, 2019, $0.6 million in the year ended December 31, 2018 and $1.4 million in the year ended December 31, 2017.

ESPP

The ESPP is 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 ESPP provides for six-month consecutive offering periods, with the purchase price of the stock equal to 85% of the lesser of the market price on the first or last day of the offering period. The maximum number of shares of common stock an employee may purchase during each offering period is 500, subject to certain adjustments pursuant to the ESPP.

In May 2017, the Compensation Committee determined to suspend all offering periods under the ESPP, effective September 1, 2017, until such time after the Merger Date as the Compensation Committee determined was best in its sole discretion. The Company's Board voted to re-implement the ESPP effective December 1, 2018 for employees in certain geographic regions, with the first purchase date of the re-implemented ESPP completed on May 31, 2019.

At December 31, 2019, 5.0 million shares, the maximum number of shares that may be issued under the ESPP, were authorized and 1.1 million shares were available under the ESPP for future issuance. The ESPP will expire on May 20, 2020.

Stock-Based Compensation

The consolidated statements of operations included stock-based compensation for the years ended December 31, 2019, 2018 and 2017 as follows (in thousands):

	Year ended December 31,		
	2019	2018	2017
Product cost of revenue	$ 76	$ 114	$ 514
Service cost of revenue	478	345	1,448
Research and development	1,898	1,797	7,337
Sales and marketing	3,028	2,935	4,885
General and administrative	7,121	5,881	11,473
	$ 12,601	$ 11,072	$ 25,657

There was no income tax benefit for employee stock-based compensation expense for the years ended December 31, 2019, 2018 and 2017 due to the valuation allowance recorded.

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 effective December 31, 2019. Stock-based compensation expense recorded for the year ended December 31, 2017 included $8.6 million of incremental expense related to the acceleration of stock options and full value awards and subsequent adjustments to the vesting schedules of the remaining unvested full value awards in connection with the Merger. In addition, the Company recorded $1.6 million of incremental expense related to the accelerated vesting of RSAs held by a former President and Chief Executive Officer in connection with his separation from the Company effective December 13, 2017.

At December 31, 2019, there was $11.3 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

Common stock reserved for future issuance at December 31, 2019 consists of the following:

2019 Plan	7,051,559
ESPP	1,148,867
	8,200,426

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.

(17) 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, 2019. Assets acquired under finance leases are included in Property and equipment, net, in the consolidated balance sheets at December 31, 2019 and 2018.

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, 2019 and determined no impairment has 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 will be 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 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

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amortization expense of $3.7 million in the year ended December 31, 2019. The Company also recorded a liability of $0.9 million in 2019 for all future anticipated variable lease costs related to these facilities. This incremental accelerated amortization and estimated future variable lease costs are included in Restructuring and related expense in the Company's consolidated statements of operations for the year ended December 31, 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 2029. 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.

At December 31, 2019, the Company had 107,800 square feet of building space in North Dallas, Texas under construction as part of its 2019 Restructuring and Facilities Consolidation Initiative. The Company's leased Plano, Texas facility will be vacated upon completion of the construction of the North Dallas, Texas site. At that time, employees will relocate to the new site as part of the 2019 Restructuring Initiative. The construction of the new North Dallas, Texas site is expected to be completed in 2020.

The Company's right-of-use lease assets and lease liabilities at December 31, 2019 and December 31, 2018 were as follows (in thousands):

	December 31, 2019	December 31, 2018
Assets		
Operating lease assets	$ 36,654	$ —
Finance lease assets*	2,420	2,104
Total leased assets	$ 39,074	$ 2,104
Liabilities		
Current		
Operating	$ 7,719	$ —
Finance	1,005	1,039
Noncurrent		
Operating	37,202	—
Finance	2,144	1,324
Total lease liabilities	$ 48,070	$ 2,363

* Finance lease assets were recorded net of accumulated depreciation of $2.0 million and $0.9 million at December 31, 2019 and December 31, 2018, respectively, and were reported as capital lease assets prior to the Company's adoption of ASC 842.

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

Operating lease cost*	$ 13,865
Finance lease cost	
Amortization of leased assets	1,106
Interest on lease liabilities	265
Short-term lease cost	19,460
Variable lease costs (costs excluded from minimum fixed lease payments)**	3,264
Sublease income	(374)
Net lease cost	$ 37,586

* Operating lease cost for the year ended December 31, 2019 includes $3.7 million of accelerated amortization for certain assets partially or fully vacated in 2019 with no intent or ability to sublease.

** Variable lease costs for the year ended December 31, 2019 include a $0.9 million accrual for all future estimated variable expenses related to certain assets partially or fully vacated in 2019 with no intent or ability to sublease.

The Company elected to use the alternative transition method, which allows entities to initially apply ASC 842 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 and $5.9 million for the years ended December 31, 2018 and 2017, respectively. Interest expense for finance leases was approximately $52,000 and $14,000 for the years ended December 31, 2018 and 2017, respectively. Amortization expense for finance leases was $0.6 million and $0.1 million for the years ended December 31, 2018 and 2017, respectively.

Other information related to the Company's leases as of and for the year ended December 31, 2019 was as follows (in thousands, except lease terms and percentages):

Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from operating leases	$	10,559
Operating cash flows from finance leases	$	265
Financing cash flows from finance leases	$	913
Weighted average remaining lease term (years):		
Operating leases		6.73
Finance leases		2.35
Weighted average discount rate:		
Operating leases		6.50%
Finance leases		7.54%

Future minimum fixed lease payments under noncancelable leases at December 31, 2019 were as follows (in thousands):

	Operating leases	Finance leases
2020	$ 10,290	$ 1,644
2021	9,468	1,159
2022	7,665	581
2023	7,067	—
2024	5,303	—
2025 and beyond	15,738	—
Total lease payments	55,531	3,384
Less: interest	(10,610)	(235)
Present value of lease liabilities	$ 44,921	$ 3,149

Future minimum fixed lease payments under noncancelable leases at December 31, 2018 were as follows (in thousands):

	Operating leases*	Finance leases
2019	$ 10,705	$ 1,386
2020	8,384	1,010
2021	7,455	288
2022	5,691	—
2023	5,430	—
2024 and beyond	19,818	—
Total lease payments	$ 57,483	2,684
Less: interest		(321)
Present value of lease liabilities**		$ 2,363

* The amounts in this column include restructuring payments aggregating approximately $1 million, of which approximately 50% was due in less than one year and the remainder was due in one to three years. These amounts exclude current estimated sublease income aggregating approximately $125,000 over the remaining lease terms for restructured facilities.

** Prior to the Company's adoption of ASC 842 on January 1, 2019, operating leases were not recorded on the consolidated balance sheet and no interest component was calculated.

(18) EMPLOYEE DEFINED CONTRIBUTION PLANS

The Company offers 401(k) savings plans to eligible employees. The Company assumed GENBAND's 401(k) savings plan in connection with the Merger. Effective January 1, 2019, the previously separate former Sonus and former GENBAND 401(k) savings plans were combined into one plan.

Effective January 1, 2018, the Company began to match 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 $4.0 million in the year ended December 31, 2019, $3.2 million in the year ended December 31, 2018 and $1.4 million in the year ended December 31, 2017.

(19) NON-U.S. EMPLOYEE DEFINED BENEFIT PLANS

In connection with the Merger, the Company assumed GENBAND's defined benefit retirement plans that cover certain employees at various international locations. The Company adopted GENBAND's policy 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 the non-U.S. defined benefit plans reflect the different economic environments within the various countries.

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 (expense) income, 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, 2019 and 2018, the funded status of the plans, and the amounts recognized in the consolidated balance sheets as of December 31, 2019 and 2018 were as follows (in thousands):

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	Year ended December 31, 2019	Year ended December 31, 2018
Changes in projected benefit obligations:		
Projected benefit obligation, beginning of year	$ 10,848	$ 11,484
Service cost	335	449
Interest cost	140	150
Participant contributions	24	5
Benefits and expenses paid	(44)	(23)
Net actuarial loss (gain) on obligation	1,059	(414)
Curtailment	82	(553)
Settlement	(660)	(250)
Projected benefit obligation, end of year	$ 11,784	$ 10,848
Changes in plan assets:		
Fair value of plan assets, beginning of year	$ 3,842	$ 3,893
Actual return on plan assets	(1,471)	(53)
Employer contributions	139	292
Participant contributions	24	5
Administrative expenses	(21)	(22)
Benefits paid	(683)	(273)
Fair value of plan assets, end of year	$ 1,830	$ 3,842
Funded status at end of year	$ (9,954)	$ (7,006)
Amounts recognized in accumulated other comprehensive loss consist of:		
Net actuarial loss	$ 2,743	$ 222
Amounts recognized in the consolidated balance sheets consist of:		
Accrued expenses and other (current pension liability)	$ (74)	$ (75)
Other long-term liabilities (non-current pension liability)	(9,880)	(6,931)
Net amount recognized	$ (9,954)	$ (7,006)

The increase in the underfunded status of the Company's defined benefit plans at December 31, 2019 compared to December 31, 2018 was the result of asset losses and a general decrease in discount rates which resulted in an increase in the projected benefit obligation.

Plans with underfunded or non-funded accumulated benefit obligations at December 31, 2019 and 2018 were as follows (in thousands):

	December 31, 2019	December 31, 2018
Aggregate projected benefit obligation	$ 11,784	$ 10,848
Aggregate accumulated benefit obligation	$ 7,759	$ 7,152
Aggregate fair value of plan assets	$ 1,830	$ 3,842

Net periodic benefit costs for the years ended December 31, 2019 and 2018 and the period from the Merger Date to December 31, 2017 were as follows (in thousands):

	Year ended December 31, 2019	Year ended December 31, 2018	October 27, 2017 to December 31, 2017
Service cost	$ 335	$ 449	$ 68
Interest cost	140	150	25
Expected return on plan assets	(14)	(45)	(8)
Plan asset expenses	21	22	4
Curtailment charge (credit)	13	(510)	—
Settlement charge	115	3	—
Net periodic benefit costs	$ 610	$ 69	$ 89

The Company made benefit payments of $683,000 and $273,000 in the years ended December 31, 2019 and 2018, respectively. These benefit payments included $660,000 and $250,000 of one-time lump sum payments to participants in 2019 and 2018, respectively. The Company made benefit payments of $3,000 in the period from the Merger Date to December 31, 2017. Expected benefit payments for the next ten years are as follows (in thousands):

Years ending December 31,	
2020	$ 74
2021	94
2022	45
2023	223
2024	57
2025 to 2029	1,661
	$ 2,154

The changes in plan assets and benefit obligations recognized in other comprehensive income (loss) before tax for the years ended December 31, 2019 and 2018 and the period from the Merger Date to December 31, 2017 were as follows (in thousands):

	Year ended December 31, 2019	Year ended December 31, 2018	October 27, 2017 to December 31, 2017
Net loss (gain)	$ 2,526	$ (356)	$ 578

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 approximately $176,000 for the year ended December 31, 2020.

The principal weighted average assumptions used to determine the benefit obligation at December 31, 2019 and 2018 were as follows:

	December 31, 2019	December 31, 2018
Discount rate	0.68%	1.30%
Rate of compensation increase	2.88%	2.83%

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Notes to Consolidated Financial Statements (Continued)

The principal weighted average assumptions used to determine net period benefit cost for the years ended December 31, 2019 and 2018 and the period from the Merger Date to December 31, 2017 were as follows:

	Year ended December 31, 2019	Year ended December 31, 2018	October 27, 2017 to December 31, 2017
Discount rate	1.30%	1.50%	1.49%
Expected long-term return on plan assets	1.12%	1.34%	1.23%
Rate of compensation increase	2.83%	3.38%	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 plans in the Netherlands and Switzerland are funded through insurance contracts, which provide guaranteed interest credit. The fair value of the contract is derived from the insurance company's assessment of the minimum value of the benefits provided by the insurance contract. The methodology used to value the plan assets assumes 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 combined plan assets was $1.8 million at December 31, 2019 and $3.8 million at December 31, 2018. The Company classifies the fair value of these plan assets as Level 2 in the fair value hierarchy as discussed in Note 5.

During the years ended December 31, 2019 and 2018, employees in the Netherlands and Switzerland made contributions to the respective pension plans aggregating $24,000 and $5,000, respectively. During the period from the Merger Date to December 31, 2017, employees in the Netherlands and Switzerland made contributions to the respective plans aggregating $5,000. 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, 2019 and 2018, the Company contributed $139,000 and $292,000, respectively, to its pension plans. During the period from the Merger Date to December 31, 2017, the Company contributed $22,000 to its pension plans. The Company expects to contribute $0.2 million to its pension plans in 2020.

(20) INCOME TAXES

The components of loss from continuing operations before income taxes consisted of the following (in thousands):

	Year ended December 31,		
	2019	2018	2017
Income (loss) before income taxes:			
United States	$ (132,887)	$ (52,569)	$ (55,932)
Foreign	9,994	(20,841)	2,240
	$ (122,893)	$ (73,410)	$ (53,692)

The provision (benefit) for income taxes from continuing operations consisted of the following (in thousands):

	Year ended December 31,		
	2019	2018	2017
Provision (benefit) for income taxes:			
Current:			
Federal	$ 11	$ 561	$ (200)
State	128	128	115
Foreign	1,744	2,198	1,960
Total current	1,883	2,887	1,875
Deferred:			
Federal	9,790	(8,481)	49,570
State	1,630	(1,414)	(4,833)
Foreign	383	(1,477)	(816)
Change in valuation allowance	(6,504)	11,885	(64,236)
Total deferred	5,299	513	(20,315)
Total	$ 7,182	$ 3,400	$ (18,440)

A reconciliation of the Company's effective tax rate for continuing operations to the statutory federal rate is as follows:

	Year ended December 31,		
	2019	2018	2017
U.S. statutory income tax rate	21.0 %	21.0 %	35.0 %
State income taxes, net of federal benefit	(0.2)	(0.1)	1.2
Foreign income taxes	(1.0)	(5.7)	(0.5)
Acquisition costs	(0.5)	(0.3)	(6.0)
Foreign deemed dividends	(0.4)	(3.4)	(3.8)
Stock-based compensation	(0.7)	(0.3)	26.8
Tax credits	2.8	0.6	(33.3)
Uncertain tax positions	(0.2)	1.3	(1.2)
NOL and credit limitations	—	—	(18.9)
Valuation allowance	(0.7)	(16.1)	29.0
Goodwill amortization	0.4	0.3	(1.7)
Meals and entertainment	(0.3)	(0.4)	(0.5)
Tax reform	(0.1)	—	8.8
Goodwill impairment	(25.4)	—	—
Other, net	(0.5)	(1.5)	(0.6)
Effective income tax rate	(5.8)%	(4.6)%	34.3 %

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The following is a summary of the significant components of deferred income tax assets and liabilities (in thousands):

	December 31, 2019	December 31, 2018
Assets:		
Net operating loss carryforwards	$ 61,057	$ 76,278
Research and development tax credits	32,879	28,664
Deferred revenue	7,868	5,755
Accrued expenses	5,687	9,601
Inventory	4,618	4,906
Stock-based compensation	2,880	1,536
Fixed assets	5,461	7,716
Other temporary differences	2,138	1,943
	122,588	136,399
Valuation allowance	(94,980)	(101,484)
Total deferred tax assets	27,608	34,915
Liabilities:		
Purchased intangible assets	(22,470)	(26,014)
Unremitted foreign income	(4,827)	(4,487)
Total deferred tax liabilities	(27,297)	(30,501)
Total net deferred tax assets	$ 311	$ 4,414
The deferred tax assets and liabilities based on tax jurisdictions are presented in the Company's consolidated balance sheets as follows:		
Deferred income taxes - noncurrent assets	$ 4,959	$ 9,152
Deferred income taxes - noncurrent liabilities	(4,648)	(4,738)
	$ 311	$ 4,414

At December 31, 2019, the Company had cumulative federal and state net operating losses ("NOLs") of $224.8 million. The federal NOL carryforwards expire at various dates from 2020 through 2037. The state NOL carryforwards expire at various dates from 2020 through 2038.

The Company also has available federal, state and foreign income tax credit carryforwards of $32.9 million that expire at various dates from 2020 through 2038.

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 and state tax authorities. 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.

In connection with the Company's adoption of ASC 606, the Company recorded an adjustment to decrease its deferred tax assets by $2.2 million in 2018. There was no impact to the Company's consolidated financial statements for this adjustment due to the Company's full valuation allowance against these assets.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Act. The Tax Act makes broad and complex changes to the U.S. tax code, including, but not limited to: reducing the U.S. federal corporate tax rate from 35% to 21%; requiring companies to pay a one-time transition tax on certain unrepatriated earnings of foreign subsidiaries; generally eliminating U.S. federal income taxes on dividends from foreign subsidiaries; requiring a current inclusion in U.S. federal taxable income of certain earnings (the Global Intangible Low-taxed Income ("GILTI")) of controlled foreign corporations; eliminating the corporate alternative minimum tax ("AMT") and changing how existing AMT credits can be realized; creating the base erosion anti-abuse tax ("BEAT"); creating a new limitation on deductible interest expense; changing rules related to uses and limitations of net operating loss carryforwards created in tax years beginning after December 31, 2017; providing a tax deduction for foreign derived intangible income ("FDII"); and changing rules related to deductibility of compensation for certain officers. The consequences of the Tax Act were reflected in the Company's U.S. tax provision for the year ended December 31, 2018 and the Company has completed its accounting for the effects of the Tax Act within the measurement period. The Company did not have any FDII or GILTI adjustments, but recorded a BEAT tax expense of $0.4 million and recorded an adjustment to the provisional amounts recorded at December 31, 2017 related to the Tax Act that decreased the Company's deferred tax assets by $0.2 million. These adjustments were recorded in the year ended December 31, 2018. When the 2018 Federal tax return was filed, there was no BEAT tax expense. The related true-up was recorded as a provision to return adjustment in the 2019 tax provision.

During 2019 and 2018, 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 domestic deferred tax asset amounting to $71.4 million at December 31, 2019 and $82.4 million at December 31, 2018. A similar analysis and conclusion were made with regard to the valuation allowance on the deferred tax assets of the Company's Ireland subsidiary, acquired as part of the acquisition of GENBAND, resulting in a valuation allowance of $9.2 million at December 31, 2019 and $9.5 million at December 31, 2018. 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 a valuation allowance of $11.0 million. In addition, because of continued losses, a valuation allowance of $2.7 million was established for the Company's Brazil subsidiary. The deferred tax assets recognized with no valuation allowance at December 31, 2019 and 2018 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):

	2019	2018	2017
Unrecognized tax benefits at January 1	$ 3,461	$ 4,528	$ 8,969
Increases related to current year tax positions	292	74	139
Increases related to prior period tax positions	—	122	430
Increases related to business acquisitions	—	—	2,012
Decreases related to prior period tax positions	(821)	(1,263)	(7,022)
Settlements	—	—	—
Unrecognized tax benefits at December 31	$ 2,932	$ 3,461	$ 4,528

The Company recorded liabilities for potential penalties and interest of $0.1 million for the year ended December 31, 2019, $0.1 million for the year ended December 31, 2018 and $0.2 million for the year ended December 31, 2017. The Company had cumulative deferred tax liabilities recorded related to interest and penalties of $0.7 million for the year ended December 31, 2019, $0.6 million for the year ended December 31, 2018 and $0.6 million for the year ended December 31, 2017. Some of the unrecognized tax benefit items are expected to reverse in 2020 due to statute of limitation lapses.

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 2016 through 2019 remain open to examination by the major taxing jurisdictions to which the Company is subject. The Company's federal NOLs generated prior to 2016 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, 2019, 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 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. Edgewater had previously been a single corporate filer for U.S. tax purposes. Consequently, 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 as part of the purchase accounting for the acquisition. For U.S. tax purposes, the future amortization of these intangibles will be non-deductible, thereby creating income. Since the Company files a consolidated U.S. tax return, the benefit from these identifiable intangible assets will be utilizable. The Company is required to determine its ability to use the tax benefit against the valuation allowance previously established. The Company has determined that it is more likely than not that these benefits will be recognized. 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.

The 2017 acquisition of GENBAND was accounted for as a non-taxable business combination. GENBAND had previously been treated as a partnership for U.S. tax purposes. Consequently, 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 cumulated losses and other factors. The Company recorded a valuation allowance against the acquired deferred tax assets. The Company recorded identifiable intangible assets as part of the purchase accounting for the acquisition. For U.S. tax purposes, the future amortization of these intangibles will be non-deductible, thereby creating income. Since the Company files a consolidated U.S. tax return, the benefit from these identifiable intangible assets will be utilizable. The Company is required to determine its ability to use the tax benefit against the valuation allowance previously established. The Company has determined that it is more likely than not that these benefits will be recognized. As a result, the valuation allowance has been reduced for the assumed net deferred tax liabilities, resulting in an income tax benefit of $16.4 million. This benefit was included as a component of the Company's provision for income taxes for the year ended December 31, 2017.

(21) MAJOR CUSTOMERS

The following customers contributed 10% or more of the Company's revenue in at least one of the years ended December 31, 2019, 2018 and 2017:

	Year ended December 31,		
	2019	2018	2017
Verizon Communications Inc.	17%	17%	17%
AT&T Inc.	12%	*	*

* Less than 10% of total revenue.

At December 31, 2019, one customer accounted for 10% or more of the Company's accounts receivable balance, representing approximately 22% of total accounts receivable. At December 31, 2018, two customers accounted for 10% or more of the Company's accounts receivable balance, representing approximately 32% in the aggregate 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.

(22) RELATED PARTIES

As a portion of the consideration for the 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 Merger, owned greater than five percent of the Company's outstanding shares. As described in Note 12 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.

(23) COMMITMENTS AND CONTINGENCIES

Litigation

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 has agreed to pay the Company an aggregate amount of $63.0 million, which includes 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 Company 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 the consolidated balance sheet at December 31, 2019. This activity is included in cash flows from operating activities in the consolidated statement of cash flows for the year ended December 31, 2019. The gain from the settlement of $63.0 million is included in Other income (expense), net, in the Company's consolidated statement of operations for the year ended December 31, 2019.

Contingencies

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.

RIBBON COMMUNICATIONS INC.

Notes to Consolidated Financial Statements (Continued)

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.

(24) QUARTERLY RESULTS (UNAUDITED)

The following tables present the Company's quarterly operating results for the years ended December 31, 2019 and 2018. 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.

	First Quarter (1)	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Fiscal 2019				
Revenue	$ 118,928	$ 145,421	$ 137,653	$ 161,109
Cost of revenue	62,339	64,748	58,776	60,164
Gross profit	$ 56,589	$ 80,673	$ 78,877	$ 100,945
(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 (3):				
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

	First Quarter	Second Quarter	Third Quarter (2)	Fourth Quarter
	(In thousands, except per share data)			
Fiscal 2018				
Revenue	$ 121,180	$ 137,361	$ 152,468	$ 166,896
Cost of revenue	65,907	62,250	70,234	71,182
Gross profit	$ 55,273	$ 75,111	$ 82,234	$ 95,714
Loss (income) from operations	$ (42,383)	$ (16,636)	$ (7,566)	$ 1,177
Net loss	$ (44,904)	$ (19,922)	$ (10,158)	$ (1,826)
Loss per share (3):				
Basic	$ (0.44)	$ (0.20)	$ (0.10)	$ (0.02)
Diluted	$ (0.44)	$ (0.20)	$ (0.10)	$ (0.02)
Shares used in computing loss per share:				
Basic	101,917	102,160	104,918	106,607
Diluted	101,917	102,160	104,918	106,607

(1) Includes the results of Anova for the period subsequent to February 28, 2019.

(2) Includes the results of Edgewater for the period subsequent to August 3, 2018.

(3) (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, 2019.

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, 2019. 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, 2019, our internal control over financial reporting was effective.

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

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, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by 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, 2019, of the Company and our report dated February 28, 2020, expressed an unqualified opinion on those financial statements and included an explanatory paragraph relating to the adoption of Accounting Standards Codification (ASC) Topic 606, “Revenue from Contracts with Customers,” on January 1, 2018 and ASC Topic 842, “Leases,” on January 1, 2019.

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 28, 2020

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 2020 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, 2019 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 2020 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, 2019 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 2020 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, 2019 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 2020 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, 2019 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 2020 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, 2019 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).
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.
10.1		Principal Stockholders Agreement, dated October 27, 2017, by and among the Registrant, Heritage PE (OEP) II, L.P. and Heritage PE (OEP) III, L.P. (incorporated by reference to Exhibit 99.1 to the Registrant's Current Report on Form 8-K12B, filed October 30, 2017 with the SEC).
10.2		Registration Rights Agreement, dated as of October 27, 2017, by and among the Registrant, Heritage PE (OEP) II, L.P. and Heritage PE (OEP) III, L.P. (incorporated by reference to Exhibit 99.2 to the Registrant's Current Report on Form 8-K12B, filed October 30, 2017 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		Lease, dated August 11, 2010, between Michelson Farm-Westford Technology Park IV Limited Partnership and the Registrant with respect to the property located at 4 Technology Park Drive, Westford, Massachusetts (incorporated by reference to Exhibit 10.1 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed November 2, 2010 with the SEC).
10.7		First Amendment to Lease, dated October 27, 2010, between Michelson Farm-Westford Technology Park IV Limited Partnership and the Registrant with respect to the property located at 4 Technology Park Drive, Westford, Massachusetts (incorporated by reference to Exhibit 10.2 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed November 2, 2010 with the SEC).
10.8		Second Amendment to Lease, dated as of June 16, 2017, by and between Michelson Farm-Westford Technology Park IV Limited Partnership and the Registrant with respect to the property located at 4 Technology Park Drive, Westford, Massachusetts (incorporated by reference to Exhibit 10.1 to Sonus, Inc.'s Current Report on Form 8-K, filed June 21, 2017 with the SEC).
10.9		Third Amendment to Lease between Michelson Farm-Westford Technology Park IV Limited Partnership and Sonus Networks, Inc., dated March 12, 2018 (incorporated by reference to Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q, filed April 30, 2018 with the SEC).
10.10	+	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).
10.11	+	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).
10.12	+	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).

10.13	+	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).
10.14	+	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).
10.15	+	Employment Agreement between the Registrant and Michael Swade, accepted September 29, 2014 (incorporated by reference to Exhibit 10.2 to Sonus, Inc.'s Quarterly Report on Form 10-Q, filed April 29, 2016 with the SEC).
10.16	+	Letter Agreement between the Registrant and Michael Swade, accepted January 13, 2019 (incorporated by reference to Exhibit 10.23 to the Registrant's Annual Report on Form 10-K/A, filed March 5, 2019 with the SEC).
10.17	+	Employment Agreement between the Registrant and Susan Villare, accepted on February 3, 2012 (incorporated by reference to Exhibit 10.1 to Sonus, Inc.'s Amendment No. 1 to Current Report on Form 8-K/A, filed July 8, 2016 with the SEC).
10.18	+	Letter Agreement between the Registrant and Susan Villare, accepted on July 7, 2016 (incorporated by reference to Exhibit 10.2 to Sonus, Inc.'s Amendment No. 1 to Current Report on Form 8-K/A, filed July 8, 2016 with the SEC).
10.19	+	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).
10.20	+	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).
10.21	+	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).
10.22	+	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).
10.23	+	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).
10.24	+	Employment Agreement, entered into as of April 20, 2018 between the Registrant, Sonus Networks, Inc. and Franklin W. Hobbs (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K/A, filed April 26, 2018 with the SEC).
10.25	+	Severance Agreement, entered into as of April 20, 2018, between the Registrant, Sonus Networks, Inc. and Franklin W. Hobbs (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K/A, filed April 26, 2018 with the SEC).
10.26	+	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).
10.27	+	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).
10.28	+	Employment Agreement, dated August 12, 2013, between the Registrant and David Walsh (incorporated by reference to Exhibit 10.36 to the Registrant's Annual Report on Form 10-K/A, filed March 5, 2019 with the SEC).
10.29	+	Amendment No. 1 to Employment Agreement, effective October 23, 2017, between the Registrant and David Walsh (incorporated by reference to Exhibit 10.37 to the Registrant's Annual Report on Form 10-K/A, filed March 5, 2019 with the SEC).
10.30	+	Letter Agreement between the Registrant and David Walsh, accepted January 13, 2019 (incorporated by reference to Exhibit 10.38 to the Registrant's Annual Report on Form 10-K/A, filed March 5, 2019 with the SEC).
10.31	+	Independent Consultancy Agreement, effective February 2, 2019, between the Registrant and David Walsh (incorporated by reference to Exhibit 10.39 to the Registrant's Annual Report on Form 10-K/A, filed March 5, 2019 with the SEC).

10.32	+	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).
10.33	+	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).
10.34		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).
10.35	+	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).
10.36	+	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).
10.37	+	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).
10.38	+	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).
10.39	+	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).
10.40	+	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).
10.41	+	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).
10.42	+	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).
10.43	+	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).
10.44	+	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).
10.45	+	Letter Agreement, dated as of February 18, 200, 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.
10.46	+	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).
10.47	+	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).
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. Interim Co-Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.

31.2	*	Certification of Ribbon Communications Inc. Interim Co-Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.3	*	Certification of Ribbon Communications Inc. Chief Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	#	Certification of Ribbon Communications Inc. Interim Co-Chief Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2	#	Certification of Ribbon Communications Inc. Interim Co-Chief Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.3	#	Certification of Ribbon Communications Inc. Chief Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS		XBRL Instance Document
101.SCH		XBRL Taxonomy Extension Schema
101.CAL		XBRL Taxonomy Extension Calculation Linkbase
101.DEF		XBRL Taxonomy Extension Definition Linkbase
101.LAB		XBRL Taxonomy Extension Label Linkbase
101.PRE		XBRL Taxonomy Extension Presentation Linkbase

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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 28, 2020	By:	/s/ Steven Bruny Steven Bruny Interim Co-President and Chief Executive Officer
February 28, 2020	By:	/s/ Kevin Riley Kevin Riley Interim Co-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/ Steven Bruny Steven Bruny	Interim Co-President and Chief Executive Officer (Interim Co-Principal Executive Officer)	February 28, 2020
/s/ Kevin Riley Kevin Riley	Interim Co-President and Chief Executive Officer (Interim Co-Principal Executive Officer)	February 28, 2020
/s/ Daryl E. Raiford Daryl E. Raiford	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 28, 2020
/s/ Eric Marmurek Eric Marmurek	Senior Vice President, Finance (Principal Accounting Officer)	February 28, 2020
/s/ Richard J. Lynch Richard J. Lynch	Chairman	February 28, 2020
/s/ Kim S. Fennebresque Kim S. Fennebresque	Director	February 28, 2020
/s/ Bruns H. Grayson Bruns H. Grayson	Director	February 28, 2020
/s/ Beatriz V. Infante Beatriz V. Infante	Director	February 28, 2020
/s/ Kent J. Mathy Kent J. Mathy	Director	February 28, 2020
/s/ Scott E. Schubert Scott E. Schubert	Director	February 28, 2020
/s/ Rick W. Smith Rick W. Smith	Director	February 28, 2020

Exhibit 4.1

DESCRIPTION OF CAPITAL STOCK

The following description of our capital stock and certain provisions of the Ribbon Communications Inc. (the "Company") Restated Certificate of Incorporation, as amended (the "Certificate of Incorporation"), and Amended and Restated By-laws (the "By-laws") are summaries and are qualified in their entirety by reference to the full text of the Company's Certificate of Incorporation and By-laws.

Authorized Capital Stock

The Company is authorized to issue up to 240,000,000 shares of common stock, $0.0001 par value per share, and 10,000,000 shares of preferred stock, $0.01 par value per share. There are no shares of preferred stock currently outstanding.

Common Stock

Dividend Rights

Holders of the Company's common stock are entitled to receive ratably any dividends that may be declared by the Company's board of directors (the "Board") out of legally available funds, subject to any preferential dividend rights of any outstanding preferred stock.

Voting Rights

Holders of the Company's common stock are entitled to one vote for each share held on all matters submitted to a vote of the stockholders and do not have cumulative voting rights. Accordingly, holders of a majority of the shares voted can elect all of the directors then standing for election.

Liquidation Rights

Upon the liquidation, dissolution or winding up of the Company, the holders of the Company's common stock are entitled to receive ratably assets available for distribution to New Solstice stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock.

Other Rights

Other than as set forth in the Company's stockholders agreement with Heritage PE (OEP) II, L.P. and Heritage PE (OEP) III, L.P. (as amended from time to time, the "Stockholders Agreement"), holders of the Company's common stock have no preemptive, subscription, redemption or conversion rights.

Preferred Stock

The Company's Board is authorized without further stockholder approval to issue from time to time up to an aggregate of 10,000,000 shares of preferred stock in one or more series. The Board has discretion to fix the designations, preferences, relative, participating, optional or other special rights, and the qualifications, limitations or restrictions, if any, of the shares of each series, including the dividend rights, dividend rates, conversion rights, voting rights, term of redemption including sinking fund provisions, redemption price or prices, liquidation preferences and the number of shares constituting any series or designations of any series without further vote or action by the stockholders.

The purpose of authorizing the Company's Board to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of the Company's outstanding voting stock.

Delaware Law and Certificate of Incorporation and By-Law Provisions; Anti-Takeover Effects

Certain provisions in the Company's Certificate of Incorporation and By-laws summarized below may be deemed to have an anti-takeover effect and may delay, deter or prevent a tender offer or takeover attempt that a stockholder might consider to be in its best interests, including attempts that might result in a premium being paid over the market price for the shares held by stockholders. These provisions are intended to enhance the likelihood of continuity and stability in the composition of the Company's Board and in the policies formulated by the Company's Board and to discourage certain types of transactions that may involve an actual or threatened change in control.

Removal of Directors; Vacancies

The Company's Certificate of Incorporation and By-laws provide, subject to the Company's Stockholders Agreement (for so long as such Stockholders Agreement is in effect):

- that directors may be removed from office at any time, (i) for cause by the affirmative vote of the holders of a majority of voting power of the shares of the Company's stock entitled to vote for the election of directors, voting together as a single class, or (ii) without cause by (a) subject to clause (b), the affirmative vote of the holders of at least $66^{2}/_{3}$% of the voting power of the shares of the Company's stock entitled to vote for the election of directors, voting together as a single class or (b) in the event recommended by at least two-thirds of the total number of authorized directors, including the approval of a majority of the independent directors (as such term is defined in the Stockholders Agreement), the affirmative vote of the holders of a majority of the voting power of the shares of the Company's stock entitled to vote for the election of directors, voting as a single class; and
- that any vacancy on the Company's Board, however occurring, including a vacancy resulting from an enlargement of the Board, may only be filled by the vote of a majority of the directors then in office.

The limitations on the removal of directors and filling of vacancies could have the effect of making it more difficult for a third party to acquire, or of discouraging a third party from acquiring, the Company.

Stockholder Action; Special Meetings of Stockholders; Advance Notice Requirements for Stockholder Proposals and Director Nominations; Supermajority Voting; Section 203 of the Delaware General Corporation Law ("DGCL")

The Company’s Certificate of Incorporation and By-laws provide that:

- any action required or permitted to be taken by the Company’s stockholders may be taken only at a duly called annual or special meeting of Company’s stockholders and may not be taken by any consent in writing by such stockholders; and
- special meetings of the stockholders may only be called by a majority of the total number of authorized directors or (for so long as the Stockholders Agreement remains in effect) a majority of the independent directors (as such term is defined in the Stockholders Agreement).

The Company’s By-laws provide that, for nominations and other business to be "properly brought" at a meeting of stockholders, a stockholder of record at such time must have given timely notice to the Secretary of the Company and must comply with the other requirements set forth in the Company’s By-laws. These provisions could delay until the next stockholders' meeting stockholder actions that are favored by the holders of a majority of the Company’s outstanding voting securities. These provisions may also discourage another person or entity from making a tender offer for the Company’s common stock, because the person or entity, even if it acquired a majority of the Company’s outstanding voting securities, would be able to take action as a stockholder, such as electing new directors or approving a merger, only at a duly called stockholders meeting, and not by written consent.

The DGCL provides that an amendment to a corporation's certificate of incorporation requires that (i) the Board adopt a resolution setting forth the proposed amendment and declaring its advisability and either call a special meeting of the stockholders entitled to vote in respect thereof for consideration of such amendment or direct that the amendment be considered at the next annual meeting of the stockholders (provided a meeting or vote is required pursuant to Section 242 of the DGCL) and (ii) the stockholders approve the amendment by a majority of outstanding shares entitled to vote. The Company’s Certificate of Incorporation provides that the affirmative vote of the holders of at least 66$^{2}/_{3}$% of the voting power of the Company’s outstanding voting stock entitled to vote thereon (in addition to any separate class vote required by law or that may in the future be required pursuant to the terms of any outstanding preferred stock) is required to amend or repeal the provisions of Articles IV (to the extent it relates to the authority of the Board to issue shares of preferred stock in one or more series, the terms of which may be determined by the Board), V (Board), VII (Indemnification), IX (Business Combinations with Interested Stockholders), X (Certain Transactions), XI (Stockholder Action), XII (Exclusive Forum), XIII (Severability) or XIV (Amendments) of the Company’s Certificate of Incorporation, or to reduce the numbers of authorized shares of common stock or preferred stock.

The Company’s Certificate of Incorporation provides that, subject to any limitations imposed by the Company’s Certificate of Incorporation, the Company’s By-laws may be altered, amended, or repealed, or new By-laws may be adopted, by resolution of the Board duly adopted by a majority of the total number of directors then constituting the full Board, including (for so long as the Stockholders Agreement remains in effect) the approval of a majority of the independent directors (as such term is defined in the Stockholders Agreement). With respect to the power of holders of capital stock to adopt, amend and repeal the Company’s By-laws, notwithstanding any other provision of the By-laws or any provision that might otherwise permit a lesser vote or no vote, in addition to any vote of the holders of any class or series of capital stock required by the By-laws or by law, the affirmative vote of the holders of the voting power of at least 66$^{2}/_{3}$% of the shares of the Company's stock entitled to vote thereon, voting together as a single class, shall be required for any such alteration, amendment, repeal or adoption by the vote of the holders of any class or series of the Company's capital stock.

Section 203 of the DGCL generally prohibits "business combinations", including mergers, sales and leases of assets, issuances of securities and similar transactions by a corporation or a subsidiary with an interested stockholder who beneficially owns 15% or more of a corporation's voting stock, within three years after the person or entity becomes an interested stockholder, unless: (i) the Board of the target corporation has approved, before the acquisition time, either the business combination or the transaction that resulted in the person becoming an interested stockholder, (ii) upon consummation of the transaction that resulted in the person becoming an interested stockholder, the person owns at least 85% of the corporation's voting stock (excluding shares owned by directors who are officers and shares owned by employee stock plans in which participants do not have the right to determine confidentially whether shares will be tendered in a tender or exchange offer) or (iii) at or after the person or entity becomes an interested stockholder, the business combination is approved by the Board and authorized at a meeting of stockholders by the affirmative vote of at least 66-2/3% of the outstanding voting stock not owned by the interested stockholder.

Section 203 of the DGCL permits a Delaware corporation to elect not to be governed by the provisions of Section 203. Pursuant to the Company’s Certificate of Incorporation, the Company has expressly elected not to be governed by the provisions of Section 203 of the DGCL. Instead, the Company’s Certificate of Incorporation provides that, notwithstanding any other provisions of the DGCL or the Company’s Certificate of Incorporation, the Company shall not engage in any business combination with any interested stockholder for a period of three years following the time that such stockholder became an interested stockholder unless: (i) the Company’s Board has approved, before the acquisition time, either the business combination or the transaction that resulted in the person becoming an interested stockholder, (ii) upon consummation of the transaction that resulted in the person becoming an interested stockholder, the person owns at least 85% of the corporation's voting stock at the time the transaction commenced (excluding for such purposes any shares owned by directors who are officers and shares owned by employee stock plans in which participants do not have the right to determine confidentially whether shares will be tendered in a tender or exchange offer) or (iii) at or after the person or entity becomes an interested stockholder, the business combination is approved by two-thirds of the total number of authorized directors, whether or not there exist any vacancies in previously authorized directorships, and by a majority of the independent directors (as defined in the Stockholders Agreement).

The foregoing restriction does not apply if (i) a stockholder becomes an interested stockholder inadvertently and (a) as soon as practicable divests itself of ownership of sufficient shares so that the stockholder ceases to be an interested stockholder; and (b) would not, at any time within the three-year period immediately prior to a business combination between the Company and such stockholder, have been an interested stockholder but for the inadvertent acquisition of ownership; or (ii) the business combination is proposed prior to the consummation or abandonment of and subsequent to the earlier of the public announcement or the notice of a proposed transaction which (a) constitutes one of the transactions described in clause (A), (B) or (C) below; (b) is with or by a person who either was not an interested stockholder during the previous three years or who became an interested stockholder with the approval of the Company’s Board; and (c) is approved or not opposed by a majority of the Company’s Board then in office (but not less than one) who were directors prior to any person becoming an interested stockholder during the previous three years or were recommended for election or elected to succeed such directors by a majority of such directors.

The proposed transactions referred to in the preceding paragraph are limited to (A) a merger or consolidation of the Company (except for a merger in respect of which, pursuant to Section 251(f) of the DGCL, no vote of the stockholders is required); (B) a sale, lease, exchange, mortgage, pledge, transfer or other disposition (in one transaction or a series of transactions), whether as part of a dissolution or otherwise, of assets of the Company or of any of its direct or indirect majority-owned subsidiaries (other than to any direct or indirect wholly owned subsidiary or to the Company) having an aggregate market value equal to 50% or more of either that aggregate market value of all of the assets of the Company determined on a consolidated basis or the aggregate market value of all the outstanding stock of the Company; or (C) a proposed tender or exchange offer for 50% or more of the outstanding voting stock of the Company. The Company will give not less than 20 days' notice to all interested stockholders prior to the consummation of any of the transactions described in clause (A) or (B) above.

Authorized but Unissued Shares

The authorized but unissued shares of the Company’s common stock and the Company’s preferred stock are available for future issuance without stockholder approval, subject to any limitations imposed by Nasdaq listing standards. These additional shares may be used for a variety of corporate finance transactions, acquisitions, and employee benefit plans. The existence of authorized but unissued and unreserved capital stock and preferred stock could make more difficult or discourage an attempt to obtain control of the Company by means of a proxy contest, tender offer, merger or otherwise.

Choice of Forum

The Company’s Certificate of Incorporation provides that unless the Company consents in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware shall, to the fullest extent permitted by law, be the sole and exclusive forum for (i) any derivative action or proceeding brought on behalf of the Company, (ii) any action asserting a claim of breach of a fiduciary duty owed by any director, officer, other employee or stockholder of the Company to the Company or the Company's stockholders, (iii) any action asserting a claim arising pursuant to any provision of the DGCL or as to which the DGCL confers jurisdiction on the Court of Chancery of the State of Delaware, or (iv) any action asserting a claim arising pursuant to any provision of the Company’s Certificate of Incorporation or the Company’s By-laws or governed by the internal affairs doctrine.

Limitation of Liability and Indemnification

The Company’s Certificate of Incorporation provides that Company’s directors and officers are to be indemnified by the Company to the fullest extent permitted by Section 145 of the DGCL, against all expense, liability and loss (including attorneys' fees, judgements, fines, ERISA excise taxes or penalties and amounts paid in settlement) reasonably incurred or suffered by such person in connection with such action, suit or proceeding and any appeal therefrom, and such indemnification shall continue as to an indemnitee who has ceased to be a director, trustee, officer, employee or agent.

The Company’s By-laws provide that the Company shall indemnify, to the fullest extent permitted by applicable law, as the same exists or may be amended, any person who was or is made a party or is threatened to be made a party to or is otherwise involved in any action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of being or having been a director or officer of the Company; or while a director or officer of the Company, serving or having served at the request of the Company as a director, trustee, officer, employee or agent of another corporation or of a partnership, joint venture, trust or other enterprise, including service with respect to an employee benefit plan, against all expense, liability and loss (including attorneys' fees, judgments, fines, ERISA excise taxes or penalties and amounts paid in settlement) reasonably incurred or suffered by such indemnitee in connection therewith.

The Company’s By-laws further provide that the right to indemnification shall include the right to be paid by the Company the expenses (including attorneys' fees) incurred in defending any such proceeding in advance of its final disposition; provided, however, that, to the extent required by law, such advancement of expenses shall be made only upon the Company's receipt of an undertaking, by or on behalf of such indemnitee, to repay all amounts so advanced if it shall ultimately be determined by final judicial decision from which there is no further right to appeal that such indemnitee is not entitled to be indemnified for such expenses under the By-laws or otherwise.

The Company may, to the extent authorized from time to time by the Board, grant rights to indemnification, and to the advancement of expenses, to any employee or agent of the Company to the fullest extent provided by the By-laws with respect to the indemnification and advancement of expenses of directors and officers of the expenses payable in advance.

The Company may, but shall not be obligated to, purchase and maintain insurance at its expense on behalf of any such person.

EXHIBIT 21.1

RIBBON COMMUNICATIONS INC.
SUBSIDIARIES OF THE REGISTRANT

Name	**Jurisdiction of Incorporation**
Edgewater Networks, Inc.	Delaware
Kandy Communications LLC	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
Ribbon Communications (Australia) Pty. Ltd.	Australia
Sonus Networks Australia Pty. Limited	Australia
GENBAND Belgium SPRL	Belgium
Ribbon Communications do Brasil Ltda	Brazil
Ribbon Communications Canada ULC	Canada
GENBAND Holdings Company	Cayman Islands
Ribbon Communications Shanghai Co., Ltd.	China
Sonus Networks (Shanghai)	China
Ribbon Communications Czech Republic s.r.o.	Czech Republic
GENBAND Telecommunications (France) Sarl	France
Ribbon Communications France EURL	France
Ribbon Communications Germany GmbH	Germany
GENBAND Telecommunications (Hong Kong) Ltd.	Hong Kong
Ribbon Communications Hong Kong Limited	Hong Kong
GENBAND Telecommunications Private Limited	India
Sonus Networks India Private Limited	India
Ribbon Communications International Limited	Ireland
Ribbon Communications Israel Limited	Israel
Eclipse Holdings Ltd.	Israel
Ribbon Communications Italy SRL	Italy
GENBAND Japan GK	Japan
Ribbon Communications K.K.	Japan
Ribbon Communications Malaysia Sdn. Bhd.	Malaysia
GENBAND Mexico, S. de R.L. de C.V.	Mexico
Westford Networks Mexico, S. De R.L. de C.V.	Mexico
GENBAND New Zealand Company	New Zealand
GENBAND Canada B.V.	Netherlands
GENBAND Coöperatie U.A.	Netherlands

GENBAND Holdings B.V.	Netherlands
GENBAND Netherlands B.V.	Netherlands
GENBAND NS B.V.	Netherlands
Ribbon Communications B.V.	Netherlands
Ribbon Communications Rus Limited Liability Company	Russia
GENBAND Saudi Arabia Limited	Saudi Arabia
Ribbon Communications Singapore Pte. Ltd.	Singapore
GENBAND Korea Yuhan Huesa	South Korea
Sonus Networks Korea LLC	South Korea
Ribbon Communications Spain SRL	Spain
Ribbon Communications Switzerland GmbH	Switzerland
Ribbon Networks Ltd. Co.	Taiwan
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. 333-232946, 333-226624, and 333-221240 on Form S-8 of our reports dated February 28, 2020, relating to the consolidated financial statements of Ribbon Communications Inc. and subsidiaries (which report expresses an unqualified opinion and includes an explanatory paragraph relating to the adoption of Accounting Standards Codification (ASC) Topic 606, “Revenue from Contracts with Customers” on January 1, 2018 and ASC Topic 842, "Leases" on January 1, 2019), 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, 2019.

/s/ Deloitte & Touche LLP

Dallas, Texas
February 28, 2020

EXHIBIT 31.1

CERTIFICATION

I, Steven Bruny, 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 28, 2020

/s/ Steven Bruny

Steven Bruny
Interim Co-President and Chief Executive Officer
(Interim Co-Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATION

I, Kevin Riley, 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 28, 2020

/s/ Kevin Riley

Kevin Riley
Interim Co-President and Chief Executive Officer
(Interim Co-Principal Executive Officer)

EXHIBIT 31.3

CERTIFICATION

I, Daryl E. Raiford, 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 28, 2020

/s/ Daryl E. Raiford

Daryl E. Raiford
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, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Steven Bruny, Interim Co-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 28, 2020

/s/ Steven Bruny

Steven Bruny
Interim Co-President and Chief Executive Officer
(Interim Co-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, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Kevin Riley, Interim Co-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 28, 2020

/s/ Kevin Riley

Kevin Riley
Interim Co-President and Chief Executive Officer
(Interim Co-Principal Executive Officer)

EXHIBIT 32.3

**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, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Daryl E. Raiford, 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 28, 2020

/s/ Daryl E. Raiford

Daryl E. Raiford
Executive Vice President and Chief Financial Officer (Principal Financial Officer)