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

FORM 10-K

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

For the fiscal year ended December 31, 2023

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

For the transition period from to

Commission File Number 001-38267

RIBBON COMMUNICATIONS INC.

(Exact name of registrant as specified in its charter)

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

6500 Chase Oaks Boulevard, Suite 100, Plano, Texas 75023
(Address of principal executive offices)(Zip Code)
(978) 614-8100
(Registrant's telephone number, including area code)
Securities registered pursuant to Section 12(b) of the Act:

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

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

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

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

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

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

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

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

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

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

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

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

The aggregate market value of the common stock held by non-affiliates of the registrant was approximately $199,304,000 based on the closing price on June 30, 2023. As of February 23, 2024, the registrant had 172,461,725 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive Proxy Statement to be delivered to stockholders in connection with the registrant's 2024 Annual Meeting of Stockholders are incorporated by reference into Part III of this report.

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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 report, including statements regarding impacts from the terrorist attacks in Israel and the resulting war, our future expenses and restructuring activities, results of operations and financial position, capital structure and the anticipated refinancing of our credit facility, credit facility compliance, expected impacts from the war in Ukraine and the financial sanctions and trade restrictions imposed in connection therewith, beliefs about our business strategy, availability of components for the manufacturing of our products, ongoing litigation, plans and objectives of management for future operations 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 unknown and/or difficult to predict and that may cause our actual results, performance or achievements to be materially different from those expressed or implied by the forward-looking statements. Such risks and uncertainties include, but are not limited to, supply chain disruptions resulting from component availability and/or geopolitical instabilities and disputes (including those related to the wars in Israel and Ukraine); the closure, on a temporary basis, of our offices in Israel as a result of the war and the impact of military call-ups of our employees in Israel; material litigation; unpredictable fluctuations in quarterly revenue and operating results; the impact of fluctuations in interest rates; the impact of fluctuations of our EBITDA on compliance under our credit facility and our ability to refinance the credit facility; material cybersecurity and data intrusion incidents, including any security breaches resulting in the theft, transfer, or unauthorized disclosure of customer, employee, or company information; our ability to comply with applicable domestic and foreign information security and privacy laws, regulations and technology platform rules or other obligations related to data privacy and security; failure to compete successfully against telecommunications equipment and networking companies; failure to grow our customer base or generate recurring business from our existing customers; credit risks; the timing of customer purchasing decisions and our recognition of revenues; macroeconomic conditions, including inflation; the impact of restructuring and cost-containment activities; our ability to adapt to rapid technological and market changes; our ability to generate positive returns on our research and development; our ability to protect our intellectual property rights and obtain necessary licenses; our ability to maintain partner, reseller, distribution and vendor support and supply relationships; the potential for defects in our products; risks related to the terms of our credit agreement; higher risks in international operations and markets; increases in tariffs, trade restrictions or taxes on our products; currency fluctuations; unanticipated adverse changes in legal, regulatory or tax laws; future accounting pronouncements or changes in our accounting policies; and/or failure or circumvention of our controls and procedures. We therefore caution you against relying on any of these forward-looking statements. Additional important factors that could cause actual results to differ materially from those in these forward-looking statements are discussed in this report, including in Item 1A., "Risk Factors" of Part I. Any forward-looking statement made by us in this report speaks only as of the date on which this report was first filed. We undertake no obligation to publicly update any forward-looking statement, whether as a result of new information, future developments or otherwise, except as may be required by law.

PART I

Item 1. Business

Company Overview

We are a leading global provider of communications technology to service providers and enterprises. We provide a broad range of software and high-performance hardware products, network solutions, and services that enable the secure delivery of data and voice communications, and high-bandwidth networking and connectivity for residential consumers and for small, medium, and large enterprises and industry verticals such as finance, education, government, utilities, and transportation. Our mission is to create a recognized global technology leader providing cloud-centric solutions that enable the secure exchange of information, with unparalleled scale, performance and elasticity. We are headquartered in Plano, Texas, and have a global presence with research and development or sales and support locations in over 30 countries around the world.

Company History

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

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

- Edgewater Networks Inc. (August 2018): Expanded our portfolio of security and signaling solutions for the enterprise network edge.
- Anova Data, Inc. (February 2019): Expanded our portfolio with additional network optimization, security, and data monetization applications, enabled by an advanced Big Data Analytics and Machine Learning platform.
- ECI Telecom Group Ltd. ("ECI") (March 2020) (the "ECI Acquisition"): Further expanded our focus and strategy to include optical transport and Internet Protocol ("IP") networking, switching, and routing products and solutions, and helped us create an industry-leading communications software and networking company with a comprehensive portfolio of advanced voice, security, data and IP optical networking and transport solutions.

Industry Background

Today's communications service providers ("CSPs") and enterprises are investing in their networks to compete in an ever-changing technology and customer experience landscape driven largely by cloud computing, mobile workforces requiring hyper-connectivity, new high-performance applications and use cases, and an insatiable demand for bandwidth by end-customers and the applications they use. The exponential growth in traffic has largely been driven by the consumption of video and in the next several years, it is expected that new applications leveraging large language model ("LLM") AI will dramatically increase the amount of network bandwidth usage. As a result, service providers and enterprises must constantly seek out new technologies to refresh their networks to provide increased flexibility, programmability, scalability, and reliability, to enable these new applications and services with an expedited time to market. These investments provide a competitive advantage and bring value-added services to increase network efficiency, increase customer satisfaction and produce new revenue streams. Within this broad industry context, investment in our products and services is driven by several key industry trends and strategic priorities.

Deployment of 5G Mobile Technology

One of the most significant investments being made by mobile carriers across the world is the deployment of 5G broadband cellular technology. This architecture shift impacts the entire ecosystem, from handsets and Radio Access Network through the metro and core network and back-office systems. The ultimate goal is a step-function improvement in capacity and coverage, as well as to unlock new revenue generating applications for consumers and businesses. The increased bandwidth unlocked by the higher capacity radio infrastructure enables new use cases such as Fixed Wireless Access, displacing lower capacity wired internet access solutions, and we believe new mobile applications will emerge, such as Reality/Virtual Reality, cloud gaming, telehealth, Internet of Things, and Industry 4.0, all made possible by the massive bandwidth increases, low latency and highly secure infrastructure that 5G provides.

As deployments increase, the access and aggregation layers of the mobile network also require significant upgrades and investment, driving fiber and IP Networking to the very edges of the network. This investment cycle and technology disruption is an opportunity for new innovative suppliers to be selected.

Demand for Hyper-Connectivity and Bandwidth Driving Fiber Access Deployment

Our global information society is overflowing with telecommunications data traffic, for business, entertainment, education, surveillance, industrial control, online retail, and many other applications. These applications, increasingly delivered from the cloud, generate a huge amount of data driven largely by the video and image components. This exponential growth in data traffic is expected to continue and even accelerate, straining existing broadband and mobile networks. While 5G, and next generation WiFi, are the technologies of choice for the wireless network, there is also a surge of investment targeted at addressing the bottle neck of the broadband access network with higher capacity fiber connections.

Governments in many countries around the world are investing to address and help close the “Digital Divide” and extend ultra-broadband services and connectivity to underserved communities. As an example, in the United States, the Broadband Equity, Access and Deployment (BEAD) Program, the FCC Rural Digital Opportunity Fund, the 5G Fund for Rural America, and the USDA Rural Development Broadband ReConnect Program expect to provide billions of dollars in funding to deliver broadband connectivity to rural communities in the U.S. Whether working or learning from home, streaming 4K television, or playing the latest online video games, rural subscribers require dependable, high-speed Internet access to participate and thrive in the digital world. Forward-looking service providers are taking advantage of government funding programs to expand network capacity and transform the communities they serve. Next-generation rural broadband networks help service providers grow their revenues by extending service reach and diversity, and by satisfying the massive pent-up demand for high-speed Internet connectivity. Next-generation broadband networks will also leverage new technologies like fixed-wireless access, while laying the foundation for future revenue opportunities like 5G backhaul transport services.

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

Increased Adoption of Cloud Communications and Collaboration

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

Evolution of Communications Service Provider Networks to Reduce Total Cost of Ownership

CSPs of all types operate in a hyper-competitive environment as consumers and businesses have an increasing number of choices for their communication needs. It is imperative that Providers invest to capture new revenue streams, while reducing the cost to operate their networks. Legacy services such as IP Multiprotocol Label Switching ("MPLS") circuits, Centrex lines, and TDM phone are increasingly expensive to operate, and Providers need to migrate customers to new offerings or risk high margin revenue streams. All these factors are causing service providers to re-think and evolve, or even over-haul, the way networks are designed, architected, managed, and optimized to deliver services to their customers with disruptive economics. They are migrating services to new software platforms that can be deployed in both private and/or public cloud environments (referred to as the "Telco Cloud") using cloud-native technologies, architectures and operational processes with automation and concepts such as Continuous Integration and Continuous Delivery ("CI/CD"). Increasingly, network operators are also pursuing open, multi-layer optimized and disaggregated IP and Optical networking solutions, where they have the flexibility to assemble networks based on transport and control subsystems from different vendors with software-defined networking.

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

This technology evolution challenge extends beyond service providers to many enterprises as well as Federal, State, and Local governments. In particular, the US Federal government and agencies have a significant need to modernize their voice communications infrastructure, replacing legacy on-premise systems with modern cloud-based voice and video solutions. However, the unique requirements regarding security and survivability are not easily met by off-the-shelf enterprise applications, creating significant opportunity for companies that specialize in this area.

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

The “critical infrastructure” market vertical is defined as those companies whose assets, systems, and networks, whether physical or virtual, are considered vital to a country’s national interest. Critical infrastructure providers are under increasing pressure to support new services, reduce carbon emission, improve security, expand automation, and increase safety. Achieving these goals requires a transition to a modernized, secure communications network that provides seamless IP connectivity and services and very high capacity optical transport. With an integrated IP and optical transport solution, a critical infrastructure network operator can provide a highly reliable, secure, future proof communications solution optimized for critical industries.

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

Strategy Overview

Our mission is to create a recognized global technology leader providing open, cloud-centric solutions spanning multiple network layers that enable the secure exchange of communications and information, with unparalleled scale, performance, and elasticity. Our transformative acquisition of ECI in 2020 dramatically expanded our addressable market beyond secure voice communications into IP Networking, Optical Transport, and Software-Defined Networking ("SDN") Management and Automation. We are implementing a focused strategy to target our broad global base of service provider and enterprise customers to establish us as key supplier of networking solutions. Key elements of the strategy include:

- *Operational Integration* – In order to provide laser focus on the unique aspects of our portfolio, we initially adopted a business unit model following the acquisition of ECI, along with regional sales teams and an integrated corporate organization. As the number of opportunities to leverage the combined portfolio emerged, we evolved the organization in 2023 and integrated the two business units under a single leader and established a Chief Operating Officer position. We have tightened the alignment further in 2024 with the integration of several software research and development ("R&D") teams and an integrated customer support and services organization. Similarly, the go-to-market team was combined under a single Global Sales Leader role. Internally we launched the "Ribbon 3.0" program, reflecting our continued transformation and drive towards best-in-class operational efficiencies and execution.

- *Cross-Selling and Tier One Service Provider Growth* - We are laser-focused on marketing and selling our combined post-acquisition broad portfolio to our global deployed base of service provider and enterprise customers to expand our presence and share of the larger IP and Optical networking and transport market and cross-sell our complete portfolio. In particular, we are focused on penetrating the largest service providers around the world in order to drive long term growth and improved competitiveness.
- *North American IP Optical Networks Market Share* – We expect to continue to unlock the value of our former ECI portfolio by growing IP Optical Networks market share in the North American market by leveraging the extensive deployment base and ongoing business that we have with service providers and enterprise customers. We have identified opportunities where we have been able to combine technology from both our Voice and IP Routing portfolios in order to address a clear customer need and differentiate our offering. We have seen significant success

with regional service providers in the U.S., bolstered by the federal funding programs focused on improving internet access to underserved markets.
- *Participate in the 5G Opportunity* – We have made significant R&D investments in our IP Optical product portfolio in order to address multiple opportunities tied to the deployment of 5G mobile networks. We are focused specifically on the access and aggregation layer of the network including cell-site routers, optical transport, and IP aggregation and routing. In many cases, the build-out of this part of the network lags or follows the up-front investment in the RAN portion of the network, and increases as traffic levels grow. We believe 5G is a multi-year opportunity as global service providers roll out the new capital-intensive technology and build out the needed network infrastructure over the next decade. We have reported several recent strategic wins in this area and believe this will be a key catalyst for growth.
- *Software-Centric and Cloud-Native Offerings* - The value of virtual, cloud-native, and software-driven solutions deployable in the cloud has only grown because of the COVID-19 pandemic and the migration of network services to the Telco Cloud, which underscores another area of major focus for us. As a strategy, we continue to aggressively transition a significant portion of our product portfolio and business model towards more software, cloud-native offerings with automation and as-a-Service selling model. We believe this transition is instrumental in continuing to improve our profitability and competitiveness, and in growing the recurring revenue portion of our business.
- *Enterprise Offerings* - The market need and growth rate are higher at the network edge than at the core. Our solution portfolio includes secure Unified Communications software-centric applications and IP and Optical network connectivity solutions. Together, these solutions address a wide number of critical infrastructure, federal defense, large enterprise, and medium-size businesses. We leverage partnerships with key go-to-market channels and solutions providers such as Dell and Microsoft, as well as other popular unified communications and collaboration ("UC&C") platforms such as Zoom Phone and similar service provider UC&C offerings.
- *Partnerships* - We continually look to form industry partnerships that will enhance our current solution offerings to our customers.

Customers

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

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

In the year ended December 31, 2023, Verizon Communications Inc. ("Verizon") accounted for approximately 11% of our revenue. Verizon is a service provider that offers interconnect, fixed line and mobile communications services, and our software solutions are sold across their business divisions supporting their large enterprises, SMB and consumer telecommunications and cable-related offerings. Our top five customers represented approximately 34% of our revenue in the year ended December 31, 2023.

Segment Information

Our Chief Operating Decision Maker ("CODM") assesses our performance based on the performance of two separate lines of our business: the Cloud and Edge segment ("Cloud and Edge") and the IP Optical Networks segment ("IP Optical Networks").

Cloud and Edge Business Segment

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

Cloud and Edge Products and Solutions

Our Cloud and Edge portfolio delivers multiple solutions for enabling VoIP, VoLTE, VoNR, and UC&C in network, on-premises, or via the Telco Cloud for a broad range of service provider and enterprise customers. The solutions provided with this portfolio include those for:

- Securing and providing resilient connectivity and calling via direct routing for Operator Connect - Microsoft Teams, Zoom and other cloud-based UC&C applications.
- Securing contact center applications.
- Securing service provider hosted and managed unified communications ("UC") services.
- Securing network interconnects for communications services.
- Network transformation of fixed service provider voice services networks to help evolve, consolidate, and modernize legacy networks to VoIP and onto virtualized network environments or the Telco Cloud.
- Implementing IP Multimedia Subsystem ("IMS") networks required by mobile service providers for VoLTE service deployments and for 5G voice services.
- Modernizing, evolving, and securing enterprise and industry vertical UC environments, supporting both on-premises and cloud-based deployments.
- Securing voice sessions and protecting VoIP communications connectivity infrastructures, contact centers, Private Branch Exchanges and media servers.
- Providing identity assurance that helps mitigate robocalls, prevent fraud by determining phone caller identity, intent, and reputation.
- Analytics to provide visibility, security, and service assurance to enhance communication network operations and customer experiences.

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

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

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

Our SBC portfolio consists of the following categories of products:

- Core network SBCs that are deployable by customers in their core networks, or on private or public clouds, and used to identify, manage, and protect voice communications traffic as it moves through and between communication networks. SBCs secure and interwork different voice communications protocols at IP network boundaries, both within and between service provider and enterprise networks. The portfolio also includes Policy and Routing products that work in heterogeneous voice networks and are used to intelligently manage communications sessions based on multiple policies such as least cost and Quality of Service routing, media type, source or destination, and time of day or week.

- Enterprise Session Border Controllers and Edge products, deployable on premises or in the cloud, to enable the deployment and migration to secure cloud-based UC&C applications such as Microsoft Teams, Zoom Phone and service provider UC&C offerings, as well as securing cloud contact center offerings. Enterprise SBCs provide service assurance and visibility within the enterprise for service-provider hosted and managed UC services. The EdgeMarc multi-service gateway portfolio provide support for enterprise voice interfaces such as PRI, T1, and FXO, as well as aggregation and transport of local data traffic. Our products are also provided as-a-service through our Ribbon Connect for Microsoft Teams Direct Routing platform, a cloud-based aaS offering for securing calls to the public telephone network from the enterprise.
- Ribbon Call Trust™ is an aaS offering for providing identity assurance. The identity assurance portfolio, using information from deployed network elements including SBCs, helps mitigate robocalls and prevent fraud by determining phone caller identity, intent, and reputation. With this information, it is possible to help determine if a call is from a legitimate person, for a legitimate purpose, and without malicious intent. Our customers utilize these capabilities to provide a better call experience to their end-customers. We are an industry leader in the development and deployment of the STIR (Secure Telephone Identity Revisited) and SHAKEN (Signature-based Handling of Asserted information using toKENS) standards, with deployments throughout North America and Europe.
- A cloud-native Analytics Platform with applications that aid customers in gathering actionable intelligence from their communications network elements, including SBCs in the core and edge of their networks, to provide them with network performance visibility, service assurance, security, and fraud mitigation.

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

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

Cloud and Edge Competition

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

- Huawei, Ericsson, Nokia, Oracle Corporation, Cisco Systems, Inc. ("Cisco") and AudioCodes Ltd. for our SBCs, Enterprise Edge products and Ribbon Connect.
- Neustar, Inc., Metaswitch Networks ("Metaswitch"), First Orion Corp., Secure Logix Corporation, TransNexus, Inc. and Transaction Network Services, Inc. for our Identity Assurance and Ribbon Call Trust offerings.
- NETSCOUT Systems, Inc., Mobileum, Empirix Inc. and Ericsson for our Analytics offerings.
- Huawei, Metaswitch, Nokia and Ericsson for our Network Transformation offerings.

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

IP Optical Networks Business Segment

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

IP Optical Networks Products and Solutions

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

Our IP Optical Networks multi-layer product portfolio includes:

- The Apollo product line provides programmable and open Optical Transport Network ("OTN") capabilities over Dense Wavelength Division Multiplexing ("DWDM") support. The OTN layer maps Ethernet and other services into OTN bit streams for transparent optical transmission, and DWDM routes wavelengths of light containing the OTN-encapsulated bit streams across wide areas, greatly increasing the efficiency and capacity of fiber facilities. Our Apollo hardware and software products deliver reconfigurable and programmable low-latency optical transport that simultaneously speeds up provisioning of new services while maximizing traffic throughput at the lowest cost per bit. Apollo provides customers with a choice of two transmission optimizations. Capacity-reach optimization uses industry-leading 5nm-140Gbaud technology that maximizes channel capacity for any given distance. It supports optical transmission speeds ranging from 400 gigabits per second for ultra-long haul applications to 1.2 terabits per second for short haul applications. Power-cost optimization uses low power consumption and cost effective 400 gigabit per second technology, which delivers strong enough performance for metro applications. The Apollo product line provides state-of-the-art transparent and flexible DWDM and OTN transport with integrated packet switching capabilities. A modular architecture allows optimized solutions across access, metro, regional, and long-haul networks. Apollo combines high performance, low-latency OTN transport, and OTN switching with software-configurable optical routing for maximum efficiency. Apollo can dynamically reconfigure optimal links in the event of fiber failures to maintain service availability. Apollo is “self-aware,” with intelligent reporting for efficient and SDN-ready operations. Apollo also provides deployment choice, whether as an integrated solution or as standalone subsystems for disaggregated open architecture multivendor solutions. A key security feature of Apollo that is used broadly in critical infrastructure and enterprise deployments is Layer 1 Optical Encryption. This uses AES-256 encryption, which is the strongest and most robust encryption standard that is commercially available today, and also supports a choice of standard, Post Quantum Computing, and Quantum Key Distribution key exchange mechanisms.
- The Neptune product line of high-performance switching and routing solutions are optimized to provide the converged multi-service, service-aware aggregation needed for cost/performance optimized connectivity between consumers and the applications and services they are using. Neptune supports multiple services delivered over multiple access network technologies. Ethernet interfaces ranging from Gigabit Ethernet ("GbE") through to 100GbE allow all IP/MPLS and Ethernet access networks to be supported, and pluggables providing XGS-PON, EPON and TDM circuit emulation allow PON access networks and legacy TDM access network to be supported. Traffic from the access networks is aggregated and connected to the services, applications, and compute platforms, meeting the specific service level agreements required for each service, including guaranteed latency, jitter, capacity, or reliability. To achieve this, Neptune uses a range of protocols such as IP/MPLS, MPLS-TP and segment routing traffic engineered ("SR-TE"). As services, applications and compute platforms become increasingly distributed across the network, located in local data centers and multi-access Edge compute platforms, Neptune, in conjunction with MUSE, can dynamically route the connectivity wherever it is required, whilst still meeting the performance requirements. In addition, Neptune provides a 400G ZR+

pluggable capability, allowing it to support both single layer IP over DWDM connectivity or multi-layer optimized IPoOTN/DWDM connectivity, whichever best meets the network operator's needs. With these capabilities, Neptune is ideally suited for residential broadband backhaul, business services, MSOs and private enterprise networks. With Flexible Ethernet, enhanced timing and synchronization capabilities, 25GbE and 50GbE interfaces and high-capacity, high-density platforms, Neptune is also ideal for 5G deployments. These capabilities and unique form factors such as DIN-rail mounting, street cabinet deployment and environmental capabilities also make Neptune a compelling solution for mission critical enterprises.

- The Muse SDN multi-layer Domain Orchestrator and cognitive software is a suite of cloud-native applications that deliver SDN domain orchestration for underlying multi-layer Neptune IP and Apollo Optical networks. This covers complete lifecycle management and automation to speed up time to revenue, reduce total cost of ownership, and facilitate integration into wider ecosystems. It is powered by a carrier-grade, cloud-native Platform as a Service and works in conjunction with our LightSOFT™ network management system. Built for a 5G services world, Muse enables network operators to programmatically configure and combine hard and soft slicing technologies to create slices appropriate to different sets of 5G-enabled services and customer sub-networks. Then, using a rich set of tools, operators can design, provision, and assure a broad array of services on top of the slices. Muse's suite of advanced service and network control applications empower service providers to do more, through simple service creation and lifecycle management, proactive network assurance, network optimization, and automation. Muse ensures that people and systems receive the right tools to monetize the network effectively through intuitive graphical user interfaces or industry-standard Application Programmable Interfaces.

IP Optical Networks Competition

Competition in the markets addressed by our IP Optical Networks products is strong. The market is shifting from an ecosystem dominated by a few large telecommunications legacy hardware equipment companies with proprietary solutions such as Ciena Corporation ("Ciena"), Cisco, and Nokia, to a market that is characterized by a combination of closed and open solutions, software-defined networking, and dis-aggregation ready for next generation networks, services and applications including 5G, leveraging merchant silicon technology. We believe this shift creates opportunities for us to increase our share in the market as compared to direct competitors such as Cisco, Juniper Networks, Inc., Huawei, Nokia, Ciena, Infinera Corporation, Adtran Networks, and Fujitsu Limited. We believe a key differentiation from these competitors is our optimized and integrated multi-layer IP optical solutions. These solutions leverage our SDN, IP routing and optical networking and control plane technologies for both IP and Optical networking layers to create a truly integrated IP Optical Network that optimizes resource utilization in real time, and provides the best overall economics to customers differentiating us from our competitors. Advanced planning algorithms design multi-layer IP Optical networks that maximize traffic handling with failure resiliency by looking holistically at all network layers, providing the best return on capital expenditures. These multi-layer optimized networks can then meet specific customer and service needs on a case-by-case basis.

Services and Support

As communication networks continue to grow increasingly vital to society and business, and complexity grows with every new technology introduction cycle, service providers are increasingly challenged to control costs and find the expertise to operate, maintain, and repair these platforms. We have a rich history of providing service-based solutions to complement our products and to help service providers and enterprises grow revenues, serve their customers, reduce costs, and improve productivity. Our Global Services organization provides a wide range of services to enable our customers to achieve those goals. Our Professional Services team includes hundreds of cloud communications, VoIP, IMS, IP and Optical networking specialists offering technical depth, network breadth and proprietary tools to assist customers in all aspects of network modernization, design, operation and deployment. Our Maintenance Support offerings deliver a comprehensive support strategy for all of our products, applications, and solutions sold. Our Managed Services offer proactive monitoring to keep customers' production communications running smoothly so they can concentrate on operating their business. In addition, our Education Services are designed to equip customers with the technical knowledge and skills needed to accelerate service readiness and delivery goals and to help customers get the most out of our products and solutions.

Sales and Marketing

We sell our portfolio of products and solutions to service provider and enterprise customers around the globe through both direct sales and indirectly through channel partners, including independent resellers, distributors, service providers and system integrators. Most of our sales to service providers are done directly and most sales to enterprises are done through channel partners. To support our customers' requirements, our direct sales team is organized geographically and by major customers. Our sales teams sell our full portfolio of products and solutions from both segments to customers in each salesperson's assigned region. Our direct sales teams and resellers are supported by a highly trained technical sales engineering staff who work closely with our customers to develop technical proposals and design systems to optimize system performance and economic benefits for our customers.

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

Manufacturing

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

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

Inventory Suppliers and Sourcing

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

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

In order to maintain competitive lead time for our customers, we employ sophisticated demand and supply management systems. We also utilize agility and safety stock processes to help meet higher-than-forecasted customer demand to stock raw material and sub-assembly inventory. Occasionally, we experience unforeseen demand drops of certain products or sub-assemblies due to technology evolution, customer consumption behavior, or shortened product lifecycle. For example, we encountered supply chain disruptions in 2021 due to component demand and logistics complications. We regularly review current inventory levels to ensure adequate reserves for excess and obsolete inventory arising from shortened product life cycle or demand drops.

The worldwide supply chain disruptions that started mid-2020 have affected multiple aspects of our product realization processes, including extended component lead-times, part shortages, higher input costs, and increased logistics complexity. This has largely moderated in 2023, however some higher input costs remain, and our inventory levels are somewhat elevated. We continue to implement specific actions to manage these issues, including investment in key re-design of sub-assemblies to improve product availability and lower costs.

The ongoing war in the Middle East has caused some disruption to material supply chain and production operations in that region. We have successfully avoided any significant impacts thus far by carefully managing the flow of material, and enacting our established business continuity processes with alternate suppliers and production operation centers.

Research and Development

Our global R&D workforce is geographically distributed across a balanced set of centers of excellence. This allows us to distribute work in a cost-effective manner and provide time-zone sensitive support to our global sales team and customers. We supplement our deep in-house expertise with a small set of long-term contracting partners, allowing us to flex up and down as required to match customer demand.

To maintain our position as a leader in product and solution development, we continue to invest in our development methodologies, leveraging and adopting industry best practices in the domains of DevOPs, Continuous Integration and Continuous Delivery ("CI/CD"), cloud-native software, and Security and Test Automation.

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

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

We leverage modern technologies and industry best practices across all of our products and solutions to provide security at each layer of the solution, enabling end to end security of the overall system. We continue to invest in analytics and automation using the latest artificial intelligence and machine learning ("AI/ML") technology, to allow our customers to operate our solutions at scale with end-to-end visibility and control over the robustness, security, and efficiency of the solution.

Intellectual Property

We believe intellectual property is fundamental to our business and success, and we depend upon our ability to develop, maintain and protect our technology. We seek to safeguard our investments in technology and rely on a combination of U.S. and foreign patent, trademark, trade secret and copyright law and contractual restrictions to protect the proprietary aspects of our technology. As of December 31, 2023, we had 688 issued patents in the U.S., 631 of which expire between 2024 and 2042, and we had 41 in-process patent applications in the U.S. As of such date, we also had 335 issued patents in foreign jurisdictions, and we had 87 in-process patent applications in foreign jurisdictions. As of December 31, 2023, we had 30 trademarks registered or pending in the U.S. and 120 trademarks registered or pending in foreign jurisdictions.

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

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

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

Regulatory Considerations

As a company with global operations, we are subject to complex U.S. and foreign laws and regulations, including trade regulations, tariffs, import and export regulations, anti-bribery and corruption laws, antitrust or competition laws, cybersecurity, privacy and data protection, among others. In addition, our operations are also subject to a number of environmental regulations such as the Waste Electrical and Electronic Equipment Directive ("WEEE") and the Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment ("RoHS"). We have developed policies and procedures to assist us in complying with these laws and regulations. Our historical compliance costs, including those related to environmental regulations, have not resulted in a material adverse effect on our business, results of operations or financial condition. We expect the laws and regulations to which we are subject will continue to increase and the future costs of compliance with existing or new regulations could materially impact our business in the future.

Our Employees

As a global company with employees in more than 30 countries, we focus on creating an inclusive global community, aligning our resources, processes, and platforms to build a work culture that reflects and expresses our core values. This enables us to work efficiently across borders and functions. Our aim is to create a workplace that is engaging, inspiring, challenging, and inclusive. We strive to be a great employer for our current employees and for future employees who are seeking an opportunity to join our dynamic business, positioned at the nexus of global communications technology and social transformation.

As of December 31, 2023, we had a total of 3,107 employees worldwide, located geographically as follows:

	Number of employees	Percentage of total
Asia	1,173	38 %
North America	863	28 %
EMEA	971	31 %
LATAM	100	3 %

Approximately 657 employees are covered by collective bargaining agreements or works councils and we believe that our relations with the labor unions are generally good.

Ribbon takes pride in conducting business in accordance with the highest ethical standards. Our Code of Conduct outlines the importance of employees acting in an honest and ethical manner. Ribbon employees are familiar with this policy. The principles of integrity, accountability and fair dealing are the cornerstone of our business and are critical to our future success. All of our employees understand that adherence to proper conduct helps us improve our competitive positioning and business outcomes. To assist in this, we are deliberate in making sure that each employee is aware that they play a role in fostering a work environment that encourages mutual respect and congenial relationships among employees.

Diversity, Equity and Inclusion ("DEI"). We believe that a culture which encourages all team members, regardless of race, sex, background, or affiliation, to take pride in their individual contributions and work together as a team is key to our success. In 2023, our DEI Council focused on conducting educational initiatives to increase awareness of different employee backgrounds, cultures, and experiences. One example of an initiative designed to increase DEI awareness was having employees write blogs on the topics of Korean Heritage and Celebrating Hispanic Roots to highlight their background and culture for their colleagues. Ribbon is committed to fostering and maintaining a culture of diversity and inclusion for employees.

Employee Hiring, Turnover and Engagement. Our turnover and hiring metrics are refreshed on a weekly basis. This up-to-date information allows us to quantify our success with employee retention, implement timely and selective retention initiatives as needed, and measure the speed at which we attract and onboard qualified candidates. In 2023, we experienced an improved retention rate compared to the previous year. Our voluntary turnover rate in 2023 was 5.9% compared to 13.3% in 2022. This increased employee retention rate in 2023 was a result of our internal retention efforts, as well as the overall slowdown of the external job market.

This lower turnover rate in 2023 resulted in a decreased need to hire externally. For the year ended December 31, 2023, we hired 149 employees globally. This compares to the 407 employees that we hired in 2022. We have a formalized employee referral program in place as we have found that employees who join us through employee referrals are a good cultural fit and remain with us longer than those who have no personal connection to us. Approximately one-third of our hires in 2023 came from employee referrals. The average time to fill a position in 2023 was just over 31 days.

Our employee management process includes conducting exit interviews with all employees that leave us voluntarily. The data obtained from this questionnaire and an in-person exit interview is referenced when creating and updating benefit plans and other employee offerings.

Our recognition program, “Real Time Rewards”, which was launched in 2022 and continued in 2023, reinforces our “thank you culture.” Our employees are able to recognize the achievements and contributions of their teammates, peers, and managers. In 2023, approximately 3,000 such awards were given, whereby 48% of our employees were recognized and rewarded for their contributions. These rewards are comprised of both monetary and non-monetary awards and are also used to recognize service anniversaries, birthdays, and other notable events.

Learning and Development (L&D). We believe that investing in our employees' personal and professional development enables them to perform their current roles with maximum effectiveness and to be prepared for roles of greater responsibility in the future. Our strong L&D programs deliver employee empowerment, boost workplace engagement and relationships, and retain talent. These learning programs utilize a combination of in-person and online curriculum and include core modules, some of which are mandatory, relating to ethical conduct, products and services, cybersecurity, safety, human rights and anti-corruption, as well as additional tailored programs on topics such as leadership, management, excellence in service, project management and competency development. In 2023, we delivered more than 21 live training webinars, 4 manager/leader development programs, 6 Excellence in Service Programs and approximately 13 training hours per employee across our workforce, matching the total hours in 2022.

Safety, Health and Well-being. Our objective is to provide a safe and hazard-free work environment for all employees. Compliance with applicable safety regulations is a top priority and we strive to maintain our strong track record for safety, which continues to be reinforced through regular training modules at all of our locations.

Also, we regularly promotes our Employee Assistance Program (the “EAP”) that is offered to all employees and their families which provides customized sessions to meet varying needs globally. The EAP is a confidential support service to help our employees and their dependents at no cost to our employees.

In addition, as a company consistently advocating for a healthy, balanced lifestyle, we offer a Wellness Program, which is available to all of our employees and their families. This program includes a variety of monthly wellness related topics delivered through activities such as webinars, exercise sessions, and engaging challenges.

In 2023, we continued our Hybrid Work Model where employees spend a minimum of two days per week working from one of our offices. This encourages collaboration, innovation, and socialization while maintaining the flexibility to work remotely as well.

Community Investment. We value the communities in which we work. We encourage a service mindset among our employees wherever they are and support community involvement and engagement. Our Employee Engagement committees have developed ongoing relationships with local Non-Profit organizations where Ribbon and our employees are contributing both time and funds to provide needed support. Ribbon also sponsors events and campaigns that support organizations such as the American Heart Association, Make a Wish Foundation, and the United Way. In addition, since 2010, we have provided a day of paid time off for all employees to participate in our Global Day of Service, during which employees and their families are encouraged to volunteer and contribute to local charitable organizations in their communities.

For additional information on Ribbon’s talent and our current engagement activities, please see our most recent sustainability report, which is available at ribboncommunications.com/company/company-policies/sustainability-report.

Corporate Governance and Social Responsibility

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

We have taken a more strategic position to our environmental, social and governance ("ESG") practices. Our ESG materiality study reviewed the expectations and requirements of both our stakeholders and our competitors to focus on the ESG practices that are most critical to our business and those where we believe we can make the largest positive impact. From this materiality study, we published a strategy, which we review with the Board of Directors from time to time, which we believe will positively impact our future environmental performance, and deliver social benefits for our customers, employees and society at large. Additionally, we believe the governance improvements made as a result of our strategy will result in enhancements in our accountability and that of our suppliers and partners.

We are committed to protecting the environment and preventing pollution within a product's lifecycle through responsible product design and requiring suppliers to adhere to sustainable practices. An example of this is our focus on continuously improving the power and space efficiency of our products to reduce overall energy consumption in our customers' networks at our own facilities. We align our compliance goals with component directives such as RoHS legislation in the European Union and China and with the European WEEE directive. We also hold a host of internationally recognized certifications for our global offerings, including ISO 9001: 2015 - Quality Management Systems; ISO 14001: 2015 - Environmental Management Systems; and SI 10000: 2013 - Social Responsibility (covering our sites in Israel).

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

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

Seasonality

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

Additional Information

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed with or furnished to the United States Securities and Exchange Commission (the “SEC”), are available free of charge through the SEC's Internet site (*http://www.sec.gov*) or our Internet site (*http://www.ribboncommunications.com*) as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. Information contained on, or that can be accessed through, our website does not constitute a part of this annual report and is not incorporated by reference herein.

Item 1A. Risk Factors

Our business faces significant risks and uncertainties. Certain important factors may have a material adverse effect on our business prospects, financial condition and results of operations, and they should be carefully considered. Accordingly, in evaluating our business, we encourage you to consider the following discussion of risk factors in its entirety in addition to other information contained in or incorporated by reference into this Annual Report on Form 10-K and our other public filings with the SEC. These are factors which, individually or in the aggregate, we think could cause our actual results to differ significantly from anticipated or historical results. In addition to understanding the key risks described below, investors should understand that it is not possible to predict or identify all risk factors, and consequently, the following is not a complete discussion of all potential risks or uncertainties. 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. Additionally, investors should not interpret the disclosure of a risk to imply that the risk has not already materialized.

Risk Factors Summary

The following is a summary of the principal risks that could adversely affect our business, operations and financial results:

Risks Related to Our Business and Industry

- Our quarterly revenue and operating results are unpredictable and may fluctuate significantly quarter to quarter.
- Failure to compete successfully could impair our ability to increase revenues and/or remain profitable.
- Our future success is dependent on growing our base of customers and expanding our recurring revenue.
- Consolidation in the telecommunications industry could harm our business.
- Restructuring activities could adversely affect our ability to execute our business strategy.
- Exposure to the credit risk of some of our customers and to credit exposures in fragile financial markets could result in material losses.
- Disruptions to relationships with distributors, resellers, system integrators and other channel partners could adversely affect our revenues.
- Failure to align our strategic plan with our customers' investments, or failure of products and services to meet customers' demands, could impact our revenues.
- Failure of our products to interoperate with our customers' existing networks could result in customer losses.
- Delay in the anticipated shift to more virtualized networks, or failure for customers to adopt our new products and services focused on virtualized networks, could reduce our revenues.
- Failure by our strategic partners or by us in integrating products could harm our business.
- We rely on contract manufacturers.
- We rely on single or limited sources for supply of some components of our products.
- Failure to correctly estimate future requirements for end-of-production products purchased from third parties could harm our operating results or business.
- Products may have errors or defects that we find only after full deployment.
- Government sales are subject to potential delays and cutbacks, may require specific testing efforts, or impose significant compliance obligations.
- Future investments, mergers or acquisitions could be difficult to integrate, disrupt our business, dilute shareholder value and harm our financial condition.
- Failure to hire and retain key personnel could negatively impact our ability to meet our business objectives and impair future growth.
- Man-made problems, such as terrorism, and natural catastrophic events may disrupt our operations and harm our operating results.

Risks Related to Our International Operations

- Worldwide global economic conditions and uncertainties may have a material adverse impact on our business.
- The wars in Israel and Ukraine could materially impact our sales to customers in that region.
- Conditions in Israel may materially and adversely affect our business.
- Risks associated with our international operations could impair our ability to grow our international revenue.
- Increases in tariffs, trade restrictions or taxes on our products could have an adverse impact on our operations.
- Fluctuations in currency exchange rates could negatively impact our financial results and cash flows.
- Use and reliance upon research and development resources in global locations may expose us to unanticipated costs and/or liabilities.

Risks Related to Intellectual Property

- Our business could be jeopardized if we are unable to protect our intellectual property.
- Failure to obtain necessary licenses or ongoing maintenance and support of third-party technology at acceptable prices on acceptable terms, or at all, it could harm our operating results or business.
- A breach of the security of our information systems or those of our third-party providers could adversely affect our operating results.

Risks Related to Regulation

- Data privacy issues, including evolving laws, regulations and associated compliance, may adversely impact our business and financial results.
- Failure to comply with the Foreign Corrupt Practices Act (“FCPA”), the U.K. Bribery Act ("UKBA") and similar regulations could subject us to significant civil or criminal penalties.

- Governmental export and import controls could subject us to liability, require a license from the U.S. government or impair our ability to compete in international markets.
- Changes in governmental regulation, especially with respect to the telecommunications industry, could harm our operating results and future prospects.

Risks Related to Our Indebtedness and Accounting Matters

- The terms of our credit agreement could adversely affect our operating flexibility and pose risks of default, which would negatively impact our liquidity and operations.
- The terms of the Series A Preferred Stock and warrants impose additional challenges on our ability to raise capital.
- Impairment of our goodwill or intangible assets may require us to record a significant charge to earnings.
- Failure to maintain appropriate internal controls in the future may adversely affect our stock price and our business.

Risks Related to Ownership of our Common Stock

- The choice of forum provision in our Certificate of Incorporation could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or agents.
- Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of us more difficult, limit attempts by our stockholders to replace or remove our current management and may negatively affect the market price of our common stock.
- Our Series A Preferred Stock has rights, preferences, and privileges that are not held by, and are preferential to, the rights of holders of our common stock.
- The existence of the liquidation preference of the Series A Preferred Stock may reduce the value of our common stock.
- The outstanding warrants are exercisable for common stock, which would increase the number of shares eligible for future resale in the public market and result in dilution to stockholders.
- We may issue debt and equity securities that are senior to our common stock, which could negatively affect the value of our common stock.

Risks Related to Ownership of our Series A Preferred Stock and Warrants

- Obligations to pay dividends or make distributions and potential liquidation payments in respect of the Series A Preferred Stock are subordinate.
- Holders of our Series A Preferred Stock have limited voting rights.
- Holders of our Series A Preferred Stock bear dividend risk.
- We may issue preferred stock in the future that ranks senior to or equally with the Series A Preferred Stock.
- The outstanding warrants are speculative in nature and may not have any value.
- Holders of our warrants will have no rights as a common stockholder until they acquire our common stock.
- An active trading market for the Series A Preferred Stock and warrants does not exist and may not develop.

General Risk Factors

- Litigation and government investigations could result in significant legal expenses and settlement payments, fines or damage awards.
- Our stock price has been and may continue to be volatile.
- We are party to a stockholders' agreement with certain stockholders which provides such stockholders with certain rights that may differ from the rights of our other stockholders.
- Delaware law and our charter documents contain provisions that could discourage or prevent a potential takeover.

For a more complete discussion of the material risks facing our business, see below.

Risks Related to our Business and Industry

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

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

Equipment purchases by CSPs and enterprises continue to be unpredictable. As with other telecommunications product suppliers, we typically recognize a portion of our revenue in a given quarter from sales booked and shipped in the last weeks of that quarter. As a result, delays in customer orders may result in delays in shipments and recognition of revenue beyond the end of a given quarter. Additionally, we rely on the revenue provided by certain large customers. It can be difficult for us to predict the timing of receipt of major customer orders, and we are unable to control their timing decisions. We have experienced significant variability in the spending patterns and purchasing practices of our 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.

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

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

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

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

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

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

We rely on certain key customers, and our future success will depend on our ability to generate recurring business from our existing customers and to attract additional customers beyond our current customer base. One customer, Verizon, contributed approximately 11% of our revenue in the year ended December 31, 2023. Our top five customers contributed approximately 34% of our revenue in 2023. Factors that may affect our ability to grow our customer base include, but are not limited to, economic conditions that discourage potential new customers from making the capital investments required to adopt new technologies; deterioration in the general financial condition of service providers and enterprises, or their ability to raise capital or access lending sources; new product introductions by our competitors; and the success of our channel partner program. If we are unable to expand our customer base, the loss of any significant customer, or any substantial reduction in purchase orders or deferral of purchasing decisions from these customers, could materially adversely affect our results of operations and financial condition.

Consolidation in the telecommunications industry could harm our business.

The telecommunications industry, including many of our customers, has experienced consolidation, including, in the carrier space, the merger between Rogers Communications Inc. and Shaw Communications Inc. (April 2023), the acquisition of certain Lumen Technologies assets by Brightspeed (2022), the merger between T-Mobile US, Inc. and Sprint Corporation (2020) and the acquisition of Blue Face Ltd. by Comcast Corporation (2020). Further, consolidation has also occurred in the telecommunications supplier and vendor space, including the proposed acquisition of Juniper Networks by Hewlett Packard Enterprises (January 2024), the combination of ADTRAN, Inc. and ADVA (2022) and the acquisition of Acacia Communications, Inc. by Cisco Systems, Inc. (2021).

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 restructuring expense of $16.2 million and $10.8 million in 2023 and 2022, respectively, including severance and related costs, facilities restructuring and accelerated amortization of lease assets. In 2024, we expect to record additional restructuring expense of approximately $5 million as we look to further streamline operations and consolidate our global footprint to reflect, among other things, a greater percentage of our workforce working from home on a go-forward basis.

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

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

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

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

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

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

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

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

Many of our distribution and channel partners sell competitive products and services, and the loss of, or reduction in sales by, these partners could materially reduce our revenue. Our sales through channel partners typically involve the use of our products as components of a larger solution being implemented by systems integrators. In these instances, the purchase and sale of our products are dependent on the channel partners, who typically control the timing, prioritization and implementation of projects. If we fail to maintain relationships with our distribution, VAR and systems integration partners, fail to develop new relationships with other partners in new markets, fail to manage, train or provide incentives to our existing partners effectively, or if these partners are not successful in their sales efforts, sales of our products and services may decrease and our operating results could suffer. Moreover, if we do not have adequate personnel, experience and resources to manage the relationships with our partners and to fulfill our responsibilities under such arrangements, any such shortcomings could have a material adverse impact on our business and results of operations.

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

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

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

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

Many of our customers will require that our products be designed to interface with their existing networks, each of which may have different specifications. Issues caused by an unanticipated lack of interoperability may result in significant warranty, support and repair costs, divert the attention of our engineering personnel from our hardware 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 a major architectural shift to the virtualization of networks. If the architectural shift does not occur, if it does not occur at the pace we predict, or if the products and services we have developed are not attractive to our customers after such shift takes place, our revenue could decline.

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

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

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

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

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

We currently rely on a small number of 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. These risks are amplified by any global supply chain disruptions. As we do not have internal manufacturing capabilities, any difficulties or failures to perform by our contract manufacturers could cause delays in customer product shipments, which could negatively affect our relationships with customers and result in delayed revenue.

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

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

We and our contract manufacturers both purchase several key components of our products. Depending upon the component, there may or may not be alternative sources of substitutes. If we overestimate our component and finished goods requirements, we could have excess inventory, which would increase our costs. If we or our contract manufacturers 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. If any of our sole or limited source suppliers experience 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 generally do not have long-term supply contracts with our component suppliers and they are not required to supply us with components for any specified periods, in any specified quantities or at any set price, except as may be specified in a particular purchase order. In the event of a disruption or delay in supply or our inability to obtain components, we may not be able to develop an alternate source in a timely manner or at favorable prices, or at all. While we regularly monitor our inventory of supplies, a failure to find acceptable alternative sources could hurt our ability to deliver high-quality products to our customers and negatively affect our operating margins.

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

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

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

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

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

Many of our 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 hardware, or the products may not operate as expected only after full deployment. Our customers expect us to establish a support infrastructure and maintain demanding support standards to ensure that their networks maintain high levels of availability and performance. As we continue to expand our distribution channel through distributors and resellers, we will need to rely on and support their service and support organizations. If we, or our distributors and resellers, are unable to fix errors or other performance problems that may be identified after full deployment of our products, or provide the expected level of support and service to our customers, we could experience increased service, support and warranty costs and a diversion of development resources, loss of customers, network performance penalties and/or legal actions by our customers, which could materially adversely affect our business and results of operations.

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

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

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

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

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

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

Mergers, acquisitions and dispositions 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 could negatively impact our ability to meet our business objectives and impair our future growth.

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

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

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

The ongoing wars in Israel and Ukraine, as well as the continued threat of terrorism and heightened security and military action in response to this threat, or any future acts of terrorism, may cause disruptions to the economies of the United States and other countries. Events such as work stoppages or widespread blackouts could have similar negative impacts. Such disruptions or uncertainties could result in delays or cancellations of customer orders or the manufacture or shipment of our products and have a material adverse effect on our business and results of operations.

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

Risks Related to our International Operations

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

A factor that significantly affects our operating results is the impact of economic conditions on the willingness of our current and potential customers to make capital investments. Given the general uncertainty regarding global economic conditions and other factors, such as inflation, high interest rates and foreign exchange rate fluctuations, 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 telecom sector, resulting in, among other things, reduced demand for our products and services as a result of our customers choosing to refrain from building capital intensive networks; increased price competition for our products, not only from our competitors, but also as a consequence of customers disposing of unutilized products; and risk of excess and obsolete inventories. Continuing turmoil in the geopolitical environment in many parts of the world may continue to put pressure on global economic conditions which in turn, could materially adversely affect our operating results. For example, following recent border clashes with China, India has enacted bans on the import of some goods manufactured in China. These bans are expected to expand to include our products that are currently manufactured in China and, as a result, we had to identify new manufacturing locations for such products. While we have developed plans to relocate our manufacturing sites, the timing required for relocation could impact our ability to sell such products or timely deliver the products, and could result in lower or lost sales in India. The need to move the manufacturing of such products could also negatively impact the margin earned on the sale of such products. If these or other sanctions are enacted, they may limit our ability to provide products and services in an important country or region for our business.

The war between Russia and Ukraine, and the sanctions imposed as a result, could materially impact our sales to customers in that region.

In 2023, approximately 6% of our sales were to customers in Eastern European countries, including Ukraine, Russia, and the surrounding countries. In February 2022, Russia commenced a military action in Ukraine. The uncertainty and the threat of an expansion of the war has resulted in some of our customers delaying purchases from us. Further, the U.S. and other European countries have imposed sanctions against Russia in connection with the war. These sanctions currently prohibit our ability to sell certain products and services to customers in Russia. The sanctions continue to evolve and further changes in the sanctions could further limit our ability to sell products and services to customers in Russia and our ability to collect on outstanding accounts receivable from such customers. We attempt to mitigate some of the risk in this region by requiring a portion of the purchase orders to be paid in advance. Since the start of the war, our customers have continued to meet their obligations to pay us. If we are further limited in our ability to sell products and services to customers in Russia and other countries for an extended period, it could have a material impact on our financial results.

Conditions in Israel may materially and adversely affect our business.

We have a significant number of employees located in Israel. As a result, political, economic and military conditions in Israel may directly affect our business. In October 2023, Hamas conducted several terrorist attacks in Israel resulting in ongoing war across the country, forcing the closure of our offices in Israel for several days. In addition, there continue to be hostilities between Israel and Hezbollah in Lebanon which resulted in rockets being fired into Israel, causing casualties and disruption of economic activities. Popular uprisings in various countries in the Middle East over the last few years have also affected the political stability of those countries and have led to a decline in the regional security situation. Such instability may also lead to deterioration in the political and trade relationships that exist between Israel and these countries. The ongoing war against Hamas and any additional conflicts, terrorist activities or political instability involving Israel or other countries in the region could adversely affect our business, results of operations, financial condition, cash flows and prospects. Although the Israeli Government currently covers the reinstatement value of direct damages that are caused by terrorist attacks or acts of war, we cannot ensure stockholders that this coverage will be maintained or will be adequate in the event we submit a claim.

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

Our operations could also be disrupted by the absence for significant periods of one or more key employees or a significant number of other employees because of military service. Some of our employees in Israel are obliged to perform military reserve duty, which generally accumulates over a period of three years from several days to up to a maximum of 84 days (and up to 108 days, in special circumstances specified under applicable law) and, in certain emergency circumstances, employees may be called to immediate and unlimited active duty. In response to the Hamas terrorist attacks in October 2023, a number of our employees in Israel have been activated for military duty and we expect that additional employees may also be activated if the war in Israel continues or expands into additional geographic areas. While we have business continuity plans in place to address the military call-ups of our employees, any of these circumstances could have a material adverse effect on our business, results of operations, financial condition, cash flows and prospects.

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

We have expanded, and expect to continue to expand, our operations in international and emerging markets. International operations are a significant part of our business, accounting for approximately 58% of total revenues in 2023. We expect such operations to continue to require significant management attention and financial resources to successfully grow. In addition, our international operations are subject to other inherent risks, including:

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

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

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

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

We manufacture certain of our appliance products and purchase a portion of our raw materials and components from suppliers in Mexico, Malaysia, China and other foreign countries. The commerce we conduct in the international marketplace makes us subject to tariffs, trade restrictions and other taxes when the raw materials or components we purchase, and the products we ship, cross international borders. Import tariffs and/or other mandates recently imposed by the United States have and could in the future lead to retaliatory actions by affected countries, including China, resulting in “trade wars,” and could significantly increase the prices on raw materials, the manufacturing of our equipment, and/or increased costs for goods imported into the United States, all of which are critical to our business. While we have developed plans to adjust manufacturing locations, if necessary, to avoid tariffs or other restrictions, any such tariffs could reduce customer demand for our products if our customers have to pay increased prices for our products as a result of such tariffs. In addition, tariff increases may have a similar impact on other suppliers and certain other customers, which could increase the negative impact on our operating results or future cash flows.

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

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

Our use and reliance upon R&D resources in global locations may expose us to unanticipated costs and/or liabilities.

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

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

Risks Related to Intellectual Property

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

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

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

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

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

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

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

Risks Related to Regulation

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

Legislation in various countries around the world with regard to cybersecurity, privacy and data protection is rapidly expanding and creating a complex compliance environment. We are subject to many privacy and data protection laws and regulations in the U.S. and around the world, some of which place restrictions on our ability to process personal data across our business. For example, the General Data Protection Regulation has caused more stringent data protection requirements in the U.K. and the European Union, which has adopted similar regulations. These privacy laws impose 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 these privacy regulations. Certain breaches of the privacy requirements could result in substantial fines. In addition to the foregoing, a breach of privacy regulations 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 and other states have enacted privacy laws that purport to create individual privacy rights for consumers and increase the privacy and security obligations of entities handling certain personal data. These laws also provide for civil penalties for violations, as well as a private right of action for data breaches that is expected to increase data breach litigation. These laws may increase our compliance costs and potential liability. Many similar laws have been proposed at the federal level and in the 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 privacy regulation compliance efforts and our data privacy compliance efforts. 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 applicable regimes.

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

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

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

In addition, if our distributors fail to obtain appropriate import, export or re-export licenses or permits, we may also be adversely affected through reputational harm and penalties. Obtaining export licenses can be difficult and time-consuming, and in some cases a license may not be available on a timely basis or at all. Changes in import/export regulations could also lead to delays in new product introductions or limit our ability to sell existing or future products in certain locations, which could adversely impact our business.

Export control laws and economic sanctions prohibit the shipment of certain products to embargoed or sanctioned countries, governments and persons, including Russia as a result of its military action against Ukraine. We cannot assure that a violation of these regulations will not occur, whether knowingly or inadvertently. Any such shipment could have negative consequences including government investigations, penalties, fines, civil and criminal sanctions, and reputational harm.

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

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

Risks Related to Our Indebtedness and Accounting Matters

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

Our Senior Secured Credit Facilities Credit Agreement, as amended, provides $475 million of commitments, comprised of a $400 million term loan (the “2020 Loan Facility”) and a $75 million revolving facility (the “2020 Revolving Credit Facility” and, together with the 2020 Loan Facility, the "2020 Credit Facility"). Terms in the 2020 Credit Facility impose limitations on our ability to, among other things, incur additional indebtedness, create liens, make acquisitions or engage in mergers, enter into transactions with affiliates, dispose of assets, make certain investments and amend or repay certain junior debt. These terms could adversely affect our operating flexibility and pose risks of default which would negatively impact our liquidity and operations. In addition, we may not be able to refinance our debt or obtain additional financing on favorable terms, or at all.

In addition, we are required to meet certain financial covenants for financings of this type, including a minimum Consolidated Fixed Charge Coverage Ratio and a maximum Consolidated Net Leverage Ratio (each as defined in the 2020 Credit Agreement) which are tested on a quarterly basis. The maximum Consolidated Net Leverage Ratio covenant uses our EBITDA (calculated in accordance with the 2020 Credit Agreement) for the last 12 months (as of the testing date) to determine compliance. While we were in compliance with the covenants at December 31, 2023, the maximum Consolidated Net Leverage Ratio and the minimum Consolidated Fixed Charge Coverage Ratio we are required to maintain under the 2020 Credit Agreement will decrease and increase, respectively, in future quarters. As a result, it could impact our ability to continue to satisfy these requirements in future periods. Our failure to comply with these covenants may result in the declaration of an event of default, which could cause us to be unable to borrow under the credit facility or result in the acceleration of the maturity of indebtedness outstanding under the 2020 Credit Facility at such time.

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

We cannot be sure that our current cash and available borrowings under our 2020 Credit Facility will be sufficient to meet our future needs. If we are unable to generate sufficient cash flows in the future, and if availability under our current facility is not sufficient to support our operations, we may need to refinance our debt or obtain additional financing. We expect to refinance our 2020 Credit Facility in 2024, however, no assurance can be provided that we will refinance our debt or obtain additional financing on favorable terms or at all.

The terms of the Series A Preferred Stock and warrants impose additional challenges on our ability to raise capital.

The terms of our Series A Preferred Stock and our outstanding warrants contain a number of restrictive covenants that may impose significant operating and financial restrictions on us while the Series A Preferred Stock and warrants remain outstanding, unless the restrictions are waived by the consent of at least 66⅔% of the then-issued and outstanding shares of Series A Preferred Stock. These restrictions include, but are not limited to, restrictions on our ability to pay dividends or make other distributions or repurchase or redeem our capital stock; issue additional equity ranking senior or pari passu to the Series A Preferred Stock; and enter into certain transactions, among other restrictions.

A breach of the covenants or restrictions under the agreements related to the sale of the Series A Preferred Stock and warrants and related agreements governing our indebtedness could result in an event of default under such agreements. As a result of these restrictions, we may be limited in how we conduct our business, unable to finance our operations through additional debt or equity financings and/or unable to compete effectively or to take advantage of new business opportunities.

Further, while we could potentially receive up to an aggregate of $18.3 million in gross proceeds from the exercise of the outstanding warrants, no assurances can be made that the holders of such warrants will elect to exercise any or all of such warrants and, accordingly, no assurance that we will receive any proceeds from the exercise of the warrants. We believe the likelihood that the holders will exercise the warrants, and therefore the amount of cash proceeds that we would receive, is dependent upon the trading price of our common stock, which as of the date this filing was below the exercise price of $3.77 for the warrants. If the trading price for our common stock is less than the exercise price for the warrants, we believe the holders of such warrants will be unlikely to exercise their warrants. Accordingly, we may not receive cash proceeds with respect to the warrants, and we are restricted in our ability to conduct additional debt or equity financings.

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

As of December 31, 2023, we had $300.9 million of goodwill and $238.1 million of intangible assets. Goodwill is tested annually for impairment and, along with our intangible assets, is also reviewed for impairment when events or changes in circumstances indicate the carrying value may not be recoverable. Based on the results of impairment testing for 2021, we determined that the carrying value of our IP Optical Networks segment exceeded its fair value and accordingly, we recorded a goodwill impairment charge of $116.0 million, which had a material impact on both our net loss and loss per share for the year ended December 31, 2021. 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.

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 any acquired businesses into our system of disclosure controls and procedures and internal control over financial reporting. Such companies may not have previously been required to implement or maintain the disclosure controls and procedures or internal control over financial reporting that are required of U.S. 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 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.

Risks Related to the Ownership of our Common Stock

Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of us more difficult, limit attempts by our stockholders to replace or remove our current management and may negatively affect the market price of our common stock.

Provisions of our Certificate of Incorporation and By-laws may have the effect of delaying or preventing a change of control or changes in our management, including, generally, provisions that:

- do not provide cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;
- allow only the Board to fill a vacancy on the Board, however occurring, including a vacancy resulting from an enlargement of the Board;
- require advance notice for stockholder proposals to be brought before a meeting of stockholders, including proposed nominations of persons for election to the board of directors;
- only allow stockholder action to be taken at an annual or special meeting;
- require a vote of holders of at least 66 2/3% of the voting power of our outstanding voting stock entitled to vote thereon to amend or repeal certain provisions of our Certificate of Incorporation or its By-laws;
- limit the ability of stockholders to call a special meeting; and
- authorize blank check preferred stock.

These provisions may make it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management. In addition, pursuant to our Certificate of Incorporation, we have expressly elected not to be governed by Section 203 of the General Corporation Law of the State of Delaware (the “DGCL”), which generally prohibits a Delaware corporation from engaging in any of a broad range of business combinations with a stockholder owning 15% or more of our outstanding voting stock, unless the stockholder has held the stock for a period of at least three years. Instead, the Certificate of Incorporation provides that, notwithstanding any other provisions of the DGCL or Certificate of Incorporation, and subject to limited exceptions, we 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 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 (as defined below)). This could delay or prevent a change of control transaction or discourage a potential acquirer from pursuing such a transaction, which transaction might have otherwise been of benefit to the other stockholders.

The choice of forum provision in our Certificate of Incorporation could limit our stockholders’ ability to obtain a favorable judicial forum for disputes with us or our directors, officers or agents.

Our Certificate of Incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (the “Court of Chancery”) is, to the fullest extent permitted by law, the sole and exclusive forum for any (i) derivative action or proceeding brought on behalf of us, (ii) any action asserting a claim of breach of a fiduciary duty owed by any director, officer, other employee or stockholder of ours, to us or our 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 our Certificate of Incorporation or our By-laws or governed by the internal affairs doctrine. The choice of forum provision may limit a stockholder’s ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or agents, which may discourage such lawsuits against us and our directors, officers and agents. Alternatively, if a court were to find the choice of forum provision contained in our Certificate of Incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business and financial condition.

Our Series A Preferred Stock has rights, preferences, and privileges that are not held by, and are preferential to, the rights of holders of our common stock, which could adversely affect our liquidity and financial condition, and may result in the interests of holders of the Series A Preferred Stock differing from holders of our common stock.

The holders of Series A Preferred Stock have the right under the Certificate of Designation to receive a liquidation preference entitling them to be paid out of our assets available for distribution to stockholders before any payment may be made to holders of any other class or series of capital stock junior to the Series A Preferred Stock, subject to the rights of existing and future creditors, an amount equal to the stated value of their shares of Series A Preferred Stock plus all accrued and unpaid dividends.

The holders of the Series A Preferred Stock will be entitled to receive cumulative dividends, at a rate of 9.25% prior to the first anniversary of the Closing Date, 9.75% per annum on or after the first anniversary of the Closing Date but prior to the second anniversary of the Closing Date and 12.00% on or after the second anniversary of the Closing Date and thereafter, and in accordance with the terms of the Certificate of Designation. The dividends on each share of Series A Preferred Stock are to be paid in cash or in-kind through an increase in the stated value of such share, as set forth in the Certificate of Designation.

We may redeem shares of Series A Preferred Stock on or after March 30, 2024 for cash at the redemption prices per share of Series A Preferred Stock of (i) 103% of the Liquidation Preference (as defined in the Certificate of Designation) if redeemed during the 12-month period beginning on March 30, 2024 to March 30, 2025 and (ii) 102% of the Liquidation Preference if redeemed on March 30, 2025 and thereafter. We are also required to redeem all shares of Series A Preferred Stock on the Maturity Date (as defined in the Certificate of Designation) at a purchase price per share of Series A Preferred Stock equal to the Mandatory Redemption Price (as defined in the Certificate of Designation), provided that such purchase can be made out of funds legally available therefor. In addition, upon certain change of control events, holders of shares of Series A Preferred Stock may require us to redeem all or part of such holder’s shares of Series A Preferred Stock at a purchase price per share of Series A Preferred Stock, payable in cash, equal to the Change of Control Purchase Price (as defined in the Certificate of Designation), provided that such purchase can be made out of funds legally available therefor.

These dividend and share redemption obligations could adversely affect our liquidity and reduce the amount of cash available for working capital, capital expenditures, growth opportunities, acquisitions, and other general corporate purposes. Our obligations to the holders of Series A Preferred Stock could also limit our ability to obtain additional financing or increase our borrowing costs, which could have an adverse effect on our financial condition. The preferential rights could also result in divergent interests between the holders of our Series A Preferred Stock and holders of shares of our Common Stock.

The existence of the liquidation preference of the Series A Preferred Stock may reduce the value of our common stock.

Our Series A Preferred Stock has a liquidation preference that is required to be paid prior to any payment on our common stock (including the shares underlying our outstanding stock purchase warrants). The payment of the liquidation preference could result in common stockholders and holders of our warrants not receiving any consideration if we were to liquidate, dissolve or wind up, either voluntarily or involuntarily. The existence of the liquidation preference may reduce the value of our common stock, make it harder for us to sell shares of our common stock in offerings in the future, or prevent or delay a change of control.

The warrants are exercisable for common stock, which would increase the number of shares eligible for future resale in the public market and result in dilution to stockholders.

The warrants to purchase an aggregate of 4,858,090 shares of our common stock are immediately exercisable. Each such warrant entitles the holder thereof to purchase one share of common stock at a price of $3.77 per whole share, subject to adjustment. To the extent such warrants are exercised, additional shares of common stock will be issued, which will result in dilution to the then existing holders of common stock and increase the number of shares eligible for resale in the public market. Sales of substantial numbers of such shares in the public market could adversely affect the market price of our common stock.

We may issue debt and equity securities that are senior to our common stock as to distributions and in liquidation, which could negatively affect the value of our common stock.

In the future, we may increase our capital resources by entering into debt or debt-like financing or issuing debt or equity securities, which could include issuances of senior notes, subordinated notes or preferred stock. In the event of our liquidation, our lenders and holders of our debt or preferred securities would receive a distribution of our available assets before distributions to the holders of our common stock. Our decision to incur debt and issue other securities in future offerings will depend on market conditions and other factors beyond our control. We cannot predict or estimate the amount, timing or nature of our future offerings and debt financings. Future offerings could reduce the value of our common stock and dilute the interests of our stockholders.

Risks Related to Ownership of our Series A Preferred Stock and Warrants

Our obligations to pay dividends or make distributions and, upon our liquidation, liquidation payments in respect of the Series A Preferred Stock are subordinate to our obligations to make any principal and interest payments due and owing with respect to our outstanding debt.

Our obligations to pay dividends or make distributions and, upon our liquidation, liquidation payments in respect of our Series A Preferred Stock are subordinate to our obligations to make any principal and interest payments due and owing with respect our outstanding debt. Accordingly, our outstanding debt has the effect of creating special risks for our Series A Preferred Stockholders that would not be present in a capital structure that did not include such securities.

Holders of our Series A Preferred Stock have limited voting rights.

Holders of Series A Preferred Stock have no voting rights with respect to matters that generally require the approval of voting stockholders. Holders of Series A Preferred Stock have the right to vote, subject to certain exceptions, with respect to any amendment of our Restated Certificate of Incorporation, as amended, (including the Certificate of Designation for the Series A Preferred Stock), any issue of Capital Stock (as defined in the Certificate of Designation), any increase or decrease of the authorized number of shares of Series A Preferred Stock and any merger or consolidation, and are not entitled to vote on any other matter except to the extent required under the General Corporation Law of the State of Delaware.

Holders of our Series A Preferred Stock bear dividend risk. We may not have sufficient funds to pay dividends on the Series A Preferred Stock. In addition, contractual restrictions may prevent us from declaring or paying dividends.

Our ability to declare and pay dividends on the Series A Preferred Stock depends on many factors, including the following:

- our financial condition, including the amount of cash we have on hand;
- the amount of cash, if any, generated by our operations and financing activities;
- our anticipated financing needs, including the amounts needed to service our indebtedness or other obligations;
- the degree to which we decide to reinvest any cash generated by our operations or financing activities to fund our future operations;
- the ability of our subsidiaries to distribute funds to us;
- regulatory restrictions on our ability to pay dividends, including under the Delaware General Corporation Law; and
- contractual restrictions on our ability to pay dividends.

Holders of Series A Preferred Stock may receive less than the full amount of accrued dividends on their Series A Preferred Stock. In addition, if we fail to declare and pay accrued dividends on the Series A Preferred Stock in full, then the value or trading price, if any, of the Series A Preferred Stock will likely decline.

If the terms of our indebtedness restrict or prohibit us from paying dividends, then we may seek to refinance that indebtedness or seek a waiver that would permit the payment of dividends. However, we may be unable or may choose not to refinance the indebtedness or obtain such a waiver.

Under the DGCL, we may declare dividends on the Series A Preferred Stock only out of our “surplus” (which generally means our total assets less total liabilities, each measured at their fair market values, less statutory capital), or, if there is no surplus, out of our net profits for the current or the immediately preceding fiscal year. We may not have sufficient surplus or net profits to declare and pay dividends on the Series A Preferred Stock.

If we fail to declare and pay full dividends on the Series A Preferred Stock, then we will be prohibited from paying dividends on our common stock and any other junior securities, subject to limited exceptions. A reduction or elimination of dividends on our common stock may cause the trading price of our common stock to decline, which, in turn, will likely depress the value or trading price, if any, of the Series A Preferred Stock.

We may issue preferred stock in the future that ranks senior to or equally with the Series A Preferred Stock with respect to dividends and liquidation rights, which may adversely affect the rights of holders of the Series A Preferred Stock.

With the consent of the holders of at least two-thirds of the outstanding Series A Preferred Stock (and any other voting stock with similar voting rights), we may authorize and issue preferred stock that ranks senior to or equally with the Series A

Preferred Stock with respect to the payment of dividends or the distribution of assets upon our liquidation, dissolution or winding up. If we issue any such preferred stock in the future, the rights of holders of the Series A Preferred Stock will be diluted and the value or trading price, if any, of the Series A Preferred Stock may decline.

The warrants are speculative in nature and may not have any value.

The outstanding warrants to purchase shares of our common stock will have value only if price of our common stock exceeds the exercise price of the warrants. There can be no assurance that the market price of our common stock will equal or exceed the exercise price of the warrants. In the event that the price of our common stock does not exceed the exercise price of the warrants, the warrants will not have any value. Holders of the warrants may exercise their right to acquire the shares of common stock and pay an exercise price of $3.77 per share prior to four years from the date of issuance, after which date any unexercised warrants will expire and have no further value.

Holders of the warrants will have no rights as a common stockholder until they acquire our common stock.

Until holders of the warrants acquire shares of our common stock upon exercise of the warrants, the holders will have no rights with respect to the common stock underlying the warrants. Upon exercise of the warrants, the holder will be entitled to exercise the rights of a common stockholder as to our common stock only as to matters for which the record date occurs after the exercise.

The market price of shares of our common stock may experience volatility, which could cause holders of the warrants to incur substantial losses.

Volatility in the trading price of our common stock could significantly affect the value or trading price, if any, of the warrants. This could result in significant volatility in the value or trading price, if any, of the warrants. The warrants will have value only if the price of our common stock exceeds the exercise price of the warrant. There can be no assurance that the market price of our common stock will equal or exceed the exercise price of the warrants. In the event that the price of our common stock does not exceed the exercise price of the warrants, or if the price of our common stock falls below the exercise price of the warrants after a holder exercises its option, the warrants will not have any value and the holders of our warrants may incur substantial losses.

An active trading market for the Series A Preferred Stock and warrants does not exist and may not develop.

The Series A Preferred Stock and warrants have no established trading market and are not listed on any securities exchange, and we do not intend to list the Series A Preferred Stock and warrants on any securities exchange. We cannot assure you that an active trading market in the Series A Preferred Stock or the warrants will develop and, even if it develops, we cannot assure you that it will last. In either case, the trading prices of the Series A Preferred Stock and warrants could be adversely affected and holders' ability to transfer shares of Series A Preferred Stock or warrants will be limited.

General Risk Factors

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

From time to time, we are subject to litigation regarding intellectual property rights or other claims and have indemnification clauses in most of our customer contracts that may require us to indemnify customers against similar claims. We have also been named as a defendant in securities class action and stockholder derivative lawsuits and have also been subject to investigations by the government. For more information on currently pending litigation, please see "Part I, Item 3. Legal Proceedings." We are generally obliged, to the extent permitted by law, to indemnify our current and former directors and officers who are named as defendants in these lawsuits. Defending against litigation or government investigation may require significant attention and resources of management. Regardless of the outcome, such litigation or investigation could result in significant legal expenses. At this time, it is not possible to predict the outcome of the ongoing lawsuits, including whether or not any proceedings will continue, and when or how these matters will be resolved or whether we will ultimately receive, and in what sum, amounts previously awarded as a result of these proceedings. Regardless of whether we are ultimately successful in these lawsuits, we will likely elect to continue to incur substantial legal fees in connection with these matters.

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

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

Our common stock price has experienced substantial volatility in the past and may remain volatile in the future. Volatility in our stock price can arise as a result of a number of the factors discussed in this "Risk Factors" section. During 2023, our closing stock price ranged from a high of $4.63 per share to a low of $1.86 per share. The stock market has experienced significant price and volume fluctuation with such volatility often unrelated to the operating performance of these companies. Actual or perceived divergence between our actual results and our forward-looking guidance for such results, the published expectations of investment analysts, or the expectations of the market generally, can cause significant swings in our stock price. Our stock price can also be affected by market conditions in our industry as well as announcements that we, our competitors, vendors or our customers may make. These may include announcements by us or our competitors of financial results or changes in estimated financial results, technological innovations, the gain or loss of customers, or other strategic initiatives. These and other factors affecting global economic conditions or financial markets may materially adversely affect the market price of our common stock in the future.

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

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

Additionally, we are party to a Second Amended and Restated Registration Rights Agreement, dated as of August 12, 2022, with the JPM Stockholders, Swarth and certain other stockholders. The JPM Stockholders and Swarth collectively own approximately 46% of our common stock as of December 31, 2023, and may decide to sell their shares in bulk or from time to time, except as provided under the Stockholders Agreement, which timing we cannot control. The sale of shares by these stockholders 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 Certificate of Incorporation, our By-Laws, as well as provisions of Delaware law, may discourage, delay or prevent a merger or acquisition that may be deemed undesirable by our Board of Directors but that a stockholder may consider favorable. These include provisions, among others,

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

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

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

Item 1B. Unresolved Staff Comments

None.

Item 1C. Cybersecurity

Cybersecurity Risk Strategy

We drive an aggressive cybersecurity roadmap aligned to internationally recognized cybersecurity frameworks and focused on evolving global threats, new cybersecurity insurance requirements and continuous improvement of incident response. Our cybersecurity program is aligned with the NIST Cybersecurity Framework and we also maintain ISO 27001 certification. Pursuant to the framework, we utilize industry leading cyber solutions and techniques to prevent, detect, and respond to incidents using a layered security model. We conduct an annual gap assessment against the NIST Cybersecurity Framework, the results of which are used to establish goals and measure progress against our cybersecurity roadmap. Based on the gap assessment, for example, we have taken a number of actions intended to reduce our cybersecurity risk, including implementing network segmentation, enhancing our email and end-point security programs and improving our web application filtering programs. We are focused on the continuous improvement of key processes such as asset management, access control, vulnerability management, incident response, and third-party risk management. We also maintain business continuity management certification to ensure the ongoing review of our business continuity, disaster recovery and incident management processes, including as a result of a cybersecurity breach.

Our Information Technology (IT) team is responsible for our cybersecurity monitoring and leverages a 24x7 Managed Detection & Response (MDR) third-party vendor to provide real-time cybersecurity threat monitoring and incident response, as well as to conduct a quarterly risk assessment. Pursuant to our incident response policy, any identified cybersecurity threats are immediately evaluated for the level of potential risk to us, with our response and remediation plan based on the potential severity of the incident. This incident risk assessment is continuously updated as we become aware of any new information regarding an identified incident. Pursuant to this plan, we will also utilize third-party experts to help identify, contain and remediate any incident that could have a significant impact on us. In addition, we use third-party experts to assist us in performing annual penetration testing and active breach assessment simulations to verify implementation of security tools, mitigating controls, and our ability to respond to real-world scenarios pursuant to our incident response policy.

As part of our cybersecurity roadmap, we also assess third-party risks, and we perform third-party risk management to identify and mitigate risks from third parties such as vendors, suppliers and other business partners associated with our use of third-party service providers. Cybersecurity risks are evaluated when determining the selection and oversight of applicable third-party service providers. In addition, we perform risk management during third-party cybersecurity compromise incidents to identify and mitigate risks to us from third-party incidents.

We are highly focused on cybersecurity awareness and perform annual certification of our employees, execute ongoing phishing campaigns, intervene with phish-prone individuals, publish monthly cybersecurity newsletters, and participate in Cybersecurity Awareness Month, in October each year.

As of the date of this Annual Report, we are not aware of any risks from cybersecurity threats that have materially affected or are reasonably likely to materially affect us, including our business strategy, results of operations and financial condition.

Cybersecurity Risk Governance

Our Board of Directors has overall responsibility for risk oversight, with its committees assisting the Board of Directors in performing this function based on their respective areas of expertise. Our Board of Directors has delegated oversight of cybersecurity risk to the Audit Committee and the Audit Committee reports on its activities and findings to the full Board of Directors. Key cybersecurity topics are presented regularly to the Audit Committee. In addition, if any cybersecurity incident is determined under our incident response policy to pose a risk in excess of an identified threshold (as set forth in the policy), our Chief Legal Officer will promptly notify the Audit Committee regarding the incident. The notification to the Audit Committee will include management's determination regarding whether or not the incident is material to us.

On an operating level, our cybersecurity program is managed by a dedicated Chief Information Security Officer (CISO), reporting to our Chief Information Officer (CIO), who together lead a geographically dispersed team comprised of our employees, highly skilled contractors and other key functional third-party resources. Our CISO holds a Masters of MIS in Information Security and prior to joining Ribbon, served as the Director of Information Security & Privacy at Ericsson for the Americas. Prior to Ericsson, she held cybersecurity positions at Walgreens, Fortunes Brands Home & Security, and W.W. Granger. She is a Certified Information Security Manager, has operated her own security firm, and has over 19 years of cybersecurity experience, including her time as a US Navy Operations and Training Manager. Our CIO has held that position (or Head of IT) at Ribbon for over 6 years. He has over 25 years of experience in the IT area including over eight years overseeing IT cybersecurity, cybersecurity roadmaps and IT general controls. During his career he has overseen initial ISO 27001 certifications, as well as the implementation of over 30 cybersecurity platforms. The CIO and CISO are part of our cybersecurity council, which also includes our CEO, CFO and other key leaders. The cybersecurity council meets monthly to review the cybersecurity metrics, new potential threats, and progress against the cybersecurity roadmap. Key matters from these monthly council meetings are presented to the Audit Committee.

Item 2. Properties

We continue to consolidate and reduce the number of facilities we operate worldwide. As of December 31, 2023, we maintained the following principal facilities:

Location	Location	Lease expiration
Plano, Texas (a)	Corporate headquarters, sales, marketing, research and development/engineering, customer support, general and administrative	September 2032
Westford, Massachusetts	Research and development, customer support, general and administrative	August 2028
Ottawa, Canada (b)	Research and development/engineering, customer support, general and administrative	December 2029
Petah Tikva, Israel (Main Campus) (b)(c)	Research and development/engineering, sales and marketing, customer support, general and administrative	January 2025
Petah Tikva, Israel (Kshatot) (b)(c)	Service, research and development/engineering, supply chain	January 2025
Bangalore, India (Delta) (d)	Research and development/engineering, customer support, general and administrative	October 2024
Bangalore, India (Alpha)	Research and development/engineering, customer support, general and administrative	December 2028

(a) A portion of this facility was not in use at December 31, 2023 and is being marketed for sublease.
(b) A portion of this facility was not in use at December 31, 2023 and some of the unused space is being subleased.
(c) We plan to consolidate and relocate our office space in Israel. A new lease was signed in 2023 for a building under construction in Petah Tikva. Buildout of the space to our specifications will begin in mid 2024 with occupancy expected in 2025.
(d) We plan to renew this lease through January 2028.

We also lease smaller spaces that are each under 50,000 square feet for our staff in various countries around the world in sales, marketing, R&D/engineering, customer services and support, as well as for warehouse purposes. We believe our remaining facilities will be adequate for our current needs and that suitable additional space will be available as needed.

Item 3. Legal Proceedings

We are subject to legal proceedings and claims that have not been fully resolved and that have arisen in the ordinary course of business. Our material legal proceedings are described in Part II, Item 8 of this Form 10-K in the Notes to Consolidated Financial Statements in Note 26, "Commitments and Contingencies" under the heading "Contingencies".

The outcome of litigation is inherently uncertain. If one or more legal matters were resolved against the Company in a reporting period for amounts above management's expectations, our financial condition and operating results for that reporting period could be materially adversely affected. We settled certain matters during the fourth quarter of 2023 that did not individually or in the aggregate have a material impact on our financial condition or operating results.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

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

Market Information

Our common stock is traded on The Nasdaq Global Select Market under the symbol "RBBN."

Holders

At February 23, 2024, there were approximately 356 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 2023:

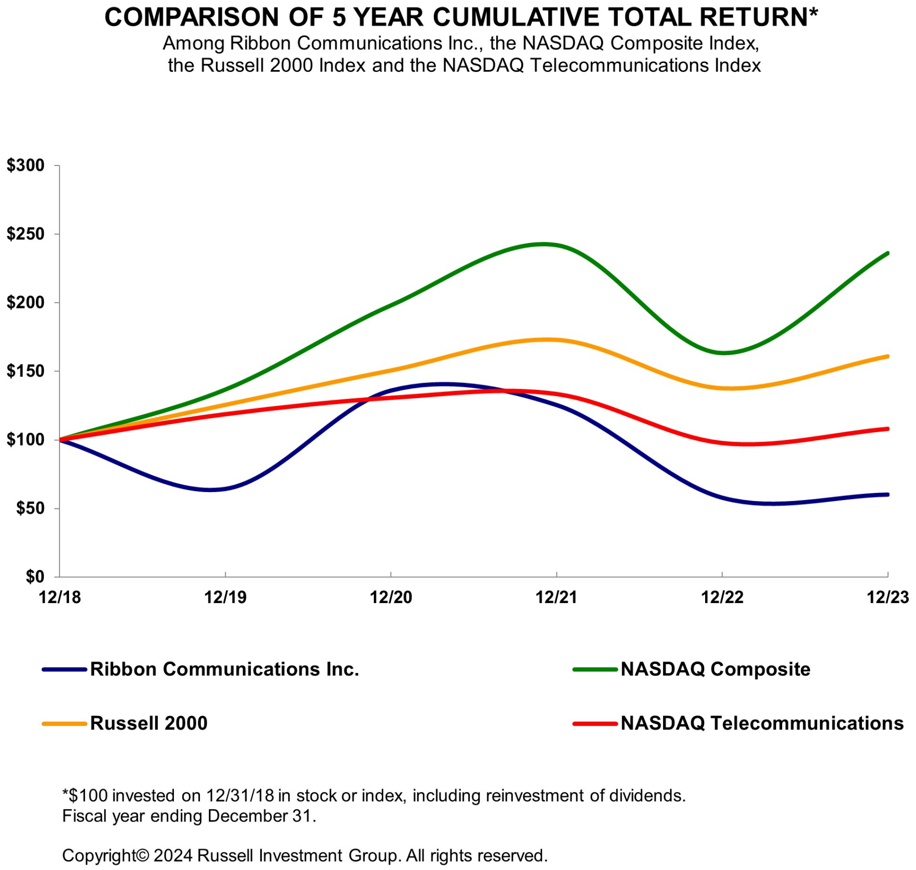
Period	Total Number of Shares Purchased (1)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet be Purchased Under the Plans or Programs
October 1, 2023 to October 31, 2023	128,636	$ 2.15	—	$ —
November 1, 2023 to November 30, 2023	29,535	$ 2.05	—	$ —
December 1, 2023 to December 31, 2023	88,882	$ 2.60	—	$ —
Total	247,053	$ 2.30	—	$ —

(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 2023, 247,053 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.

Performance Graph

The following performance graph compares the cumulative total return to stockholders for our common stock for the period from December 31, 2018 through December 31, 2023 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 December 31, 2018 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.



	December 31, 2018	December 31, 2019	December 31, 2020	December 31, 2021	December 31, 2022	December 31, 2023
Ribbon Communications Inc.	$ 100.00	$ 64.32	$ 136.10	$ 125.52	$ 57.88	$ 60.17
Nasdaq Composite	$ 100.00	$ 136.69	$ 198.10	$ 242.03	$ 163.28	$ 236.17
Russell 2000	$ 100.00	$ 125.52	$ 150.58	$ 172.90	$ 137.56	$ 160.85
Nasdaq Telecommunications	$ 100.00	$ 118.74	$ 130.71	$ 133.51	$ 97.62	$ 108.00

Item 6. [Reserved]

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

The following discussion should be read in conjunction with our financial statements and the related notes included in Item 8, "Financial Statements and Supplementary Data" in this Annual Report on Form 10-K. This discussion contains forward-looking statements that reflect our plans, estimates and beliefs and involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors including, but not limited to, those disclosed in Item 1A, "Risk Factors", elsewhere in this Annual Report on Form 10-K, in other documents filed with the SEC and otherwise publicly disclosed. Please refer to "Cautionary Note Regarding Forward-Looking Statements" above for additional information. For a complete description of our business and other important information, please refer to Item 1 of Part I of this Annual Report on Form 10-K.

Overview

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

Key Trends and Economic Factors Affecting Ribbon

Supplier Disruptions. Ongoing uncertainty in the global economy due to inflation, the wars in Israel and Ukraine, national security concerns and other factors, continue to disrupt various manufacturing, commodity and financial markets, increase volatility, and impede global supply chains. Our ability to deliver our solutions as agreed upon with our customers depends in part on the ability of our global contract manufacturers, vendors, licensors and other business partners to deliver products or perform services we have procured from them.

Continued uncertain global economic conditions, may cause our customers to restrict spending or delay purchases for an indeterminate period of time and consequently cause our revenues to decline. Further, such factors may negatively impact our operating costs resulting in a reduction in net income. The degree to which the ongoing wars in Israel and Ukraine and the inflationary and high interest rate environment impacts our future business, financial position and results of operations will depend on developments beyond our control, including the duration of the global economic downturn that has resulted from these factors.

The Ongoing Wars in Israel and Ukraine. The uncertainty resulting from the wars in Israel and Ukraine and the threat for expansion of one or both of these wars could result in some of our customers delaying purchases from us. As a result of safety concerns, we may close our offices in Israel from time to time. Although our employees in these offices have the ability to work remotely and business continuity plans are in place to address any medium- or long-term disruptions that could result from the closure of these offices, the office closures and general effects of employees operating in a region at war could have a negative impact on our operations. Further, a number of our employees in Israel are members of the military reserves and subject to immediate call-up in response to the war in Israel. Following the terrorist attacks in Israel in October 2023, a number of our employees have been activated for military duty and we expect that additional employees will also be activated if the war in Israel continues. While we have business continuity plans in place to address the military call-ups, it could affect the timing of projects in the short-term as the work is shifted to other team members both inside and outside of Israel.

Further, the U.S. and other European countries have imposed sanctions and trade restrictions against Russia in connection with the war in Ukraine. These sanctions and restrictions currently prohibit our ability to sell certain products and services. The sanctions continue to evolve and further changes in the current sanctions or trade restrictions could further limit our ability to sell products and services to customers in Russia and, our ability to collect on outstanding accounts receivable from such customers. If we are further limited in our ability to sell products and services to Russia and other countries for an extended period, it could have a material impact on our financial results.

Inflation and Interest Rates. We continue to see near-term impacts on our business due to inflation, including ongoing global price pressures driving up energy prices, component costs, freight premiums, and other operating costs above normal rates. Although headline inflation in the United States and Europe appears to have reached a peak, core inflation (excluding food and energy prices) remains elevated and is a source of continued cost pressure on businesses and households. Interest rates have increased significantly as central banks in developed countries attempt to subdue inflation while government deficits and debt remain at high levels in many global markets. Accordingly, the eventual implications of higher government deficits and debt, tighter monetary policy, and potentially higher long-term interest rates may drive a higher cost of capital for our business.

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 million dollar amount, and all percentages, excluding tabular information, are rounded to the nearest percentage point.

Private Placement

On March 28, 2023, we issued 55,000 shares of newly designated Series A Preferred Stock (the "Preferred Stock") to investors in a private placement offering at a price of $970 per share, along with 4.9 million warrants (the "Warrants") to purchase shares of our common stock, par value $0.0001 per share (the "Private Placement"), at an exercise price of $3.77 per share. The proceeds from the Private Placement were approximately $53.4 million, including approximately $10 million from existing related party stockholders. For additional detail on the Private Placement, see Note 16 - Preferred Stock and Warrants to our consolidated financial statements.

2023 Restructuring Plan

In February 2023, our Board of Directors approved a strategic restructuring program (the "2023 Restructuring Plan") to streamline our operations in order to support our investment in critical growth areas. The 2023 Restructuring Plan includes, among other things, charges related to a workforce reduction. Any potential positions eliminated in countries outside the United States are subject to local law and consultation requirements.

We recorded restructuring and related expense of $9.9 million in the year ended December 31, 2023 in connection with the 2023 Restructuring Plan for severance related costs. We anticipate that we will record nominal future expense for severance in connection with the 2023 Restructuring Plan.

Operating Segments

Our CODM assesses our performance based on the performance of two separate organizations within Ribbon, the Cloud and Edge operating segment ("Cloud and Edge") and the IP Optical Networks operating segment ("IP Optical Networks"). For additional details regarding our operating segments, see Note 18 - Operating Segment Information to our consolidated financial statements.

Financial Overview

Financial Results

We reported a loss from operations of $24.3 million for 2023 and $48.3 million for 2022. We reported a net loss of $66.2 million for 2023 and $98.1 million for 2022.

Our revenue was $826.3 million in 2023, comprised of $477.6 million attributable to Cloud and Edge and $348.7 million attributable to IP Optical Networks. Our revenue was $819.8 million in 2022, comprised of $508.2 million attributable to Cloud and Edge and $311.6 million attributable to IP Optical Networks. Our gross profit was $408.1 million in 2023, comprised of $300.0 million attributable to Cloud and Edge and $108.1 million attributable to IP Optical Networks. Our gross profit was $400.9 million in 2022, comprised of $310.3 million attributable to Cloud and Edge and $90.6 million attributable to IP Optical Networks. Our gross margin was 49.4% in 2023 and 48.9% in 2022. In 2023, our Cloud and Edge gross margin was 62.8% and our IP Optical Networks gross margin was 31.0%. In 2022, our Cloud and Edge gross margin was 61.1% and our IP Optical Networks gross margin was 29.1%.

Our operating expenses were $432.4 million in 2023 and $449.3 million in 2022. Our 2023 operating expenses included $28.6 million of amortization of acquired intangible assets, $4.5 million of acquisition-, disposal- and integration-related expense, and $16.2 million of restructuring and related expense. Our 2022 operating expenses included $29.6 million of amortization of acquired intangible assets, $6.3 million of acquisition-, disposal- and integration-related expense, and $10.8 million of restructuring and related expense.

We recorded stock-based compensation expense of $21.8 million in 2023 and $18.7 million in 2022.

See "Results of Operations" in this MD&A for additional discussion of our results of operations for the years ended December 31, 2023 and 2022.

Restructuring and Cost Reduction Initiatives

In February 2023, our Board of Directors approved the 2023 Restructuring Plan to streamline our operations in order to support our investment in critical growth areas. The 2023 Restructuring Plan includes, among other things, charges related to a workforce reduction. Any potential positions eliminated in countries outside the United States are subject to local law and consultation requirements. We recorded restructuring and related expense of $9.9 million in 2023 in connection with the 2023 Restructuring Plan for severance related costs for approximately 200 employees. We anticipate that we will record nominal future expense for severance in connection with the 2023 Restructuring Plan.

In February 2022, our Board of Directors approved the 2022 Restructuring Plan to streamline our operations in order to support our investment in critical growth areas. The 2022 Restructuring Plan includes, among other things, charges related to a consolidation of facilities and a workforce reduction. Any positions eliminated in countries outside the United States are subject to local law and consultation requirements. In connection with the 2022 Restructuring Plan, we recorded restructuring and related expense of $6.3 million in 2023, comprised of $5.3 million for variable and other facilities-related costs and $1.0 million for accelerated amortization of lease assets no longer being used with no ability or intent to sublease. In 2022, we recorded $10.2 million of expense for the 2022 Restructuring Plan, comprised of $3.3 million for variable and other facilities-related costs, $1.6 million for accelerated amortization of lease assets no longer being used with no ability or intent to sublease, and $5.3 million for severance and related costs for approximately 70 employees. We anticipate that we will expense $5 million in 2024 related to the 2022 Restructuring Plan.

In 2020, we implemented a restructuring plan to eliminate certain positions and redundant facilities, primarily in connection with the ECI Acquisition, to further streamline our global footprint and improve our operations (the "2020 Restructuring Initiative"). In connection with the 2020 Restructuring Initiative, we eliminated duplicate functions arising from the ECI Acquisition in support of our efforts to integrate the two companies. In connection with the 2020 Restructuring Initiative, we recorded no expense in 2023, a nominal amount of restructuring and related expense in 2022 and $4.7 million of such expense in 2021. The 2021 amount was comprised of $4.6 million for severance and related costs for approximately 60 employees and $0.1 million for variable and other facilities-related costs. All amounts will be fully paid in 2024. We do not expect to record any future restructuring and related expense under the 2020 Restructuring Initiative.

In 2019, we implemented a restructuring plan to streamline our global footprint, improve our operations and enhance our customer delivery (the "2019 Restructuring Initiative"). The 2019 Restructuring Initiative includes facility consolidations, refinement of our research and development activities, and a reduction in workforce. The facility consolidations under the 2019 Restructuring Initiative (the "Facilities Initiative") included 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, the Facilities Initiative included consolidating 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 substantially completed in 2024. In connection with the 2019 Restructuring Initiative, we recorded no restructuring and related expense in 2023, $0.7 million in 2022 comprised entirely of facilities related expense and $7.0 million of such expense in 2021, comprised of $5.7 million for variable and other facilities-related costs and $1.3 million of net expense for accelerated amortization of lease assets. The amount of $1.3 million for accelerated amortization of lease assets was comprised of $3.4 million of expense, partially offset by $2.1 million of income related to a lease modification for one of our restructured lease facilities. The amount initially accrued for severance and related costs under this 2019 Restructuring Initiative was paid in 2021.

Accelerated rent amortization is recognized from the date that we commence the plan to fully or partially vacate a facility, for which there is no intent or ability to enter into a sublease, through the final vacate date. We recorded $1.0 million, $1.6 million and $3.4 million of expense for accelerated rent amortization in the years ended December 31, 2023, 2022 and 2021, respectively. These amounts are included as components of Restructuring and related expense in our statements of operations, reducing our Operating lease right-of-use assets in our consolidated balance sheets at the end of each respective year. We continue to evaluate our properties included in the Facilities Initiative for accelerated amortization and/or right-of-use asset impairment. We may incur additional future expense if we are unable to sublease other locations included in the Facilities Initiative.

Critical Accounting Policies and Estimates

This MD&A 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. The significant accounting policies that we believe are the most critical include revenue recognition, the valuation of inventory, debentures and warrants received as sale consideration, warranty accruals, loss contingencies and reserves, stock-based compensation, the Preferred Stock and Warrants, business combinations, goodwill and intangible assets, accounting for leases, and accounting for income taxes. If actual results differ significantly from management's estimates and projections, there could be a material effect on our consolidated financial statements.

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

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

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

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

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

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

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

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

Investments. We received debentures (the "Debentures") and warrants (the "AVCT Warrants") as sale consideration in connection with our December 1, 2020 sale of the Kandy Communications Business to American Virtual Cloud Technologies, Inc. ("AVCT") (the "Kandy Sale"). On September 8, 2021 (the "Debenture Conversion Date"), the Debentures were converted into shares of AVCT common stock (the "Debenture Shares"). In connection with the conversion of the Debentures to the Debenture Shares, we elected to use the fair value option to account for its equity investment in AVCT as permitted under Accounting Standards Codification ("ASC") 825, *Financial Instruments* ("ASC 825"), which then refers to ASC 820, *Fair Value Measurement* ("ASC 820") to provide the fair value framework for valuing such investments. In accordance with ASC 820, we recorded the investment in AVCT at fair value, with changes in fair value recorded as a component of Other (expense) income, net, in the consolidated statements of operations.

On August 29, 2022, we and AVCT entered into a settlement agreement which provided for, amongst other things, the cancellation of our investment in the Debenture Shares and the AVCT Warrants. Pursuant to the settlement agreement, we also entered into a Wind Down Agreement with AVCT, pursuant to which a Reseller Agreement between the parties, as previously amended, was terminated, and we were granted a non-exclusive perpetual license to use and modify certain intellectual property owned by AVCT comprising WebRTC gateway technology that is integrated with Ribbon's SBCs and Application Servers. The perpetual license granted by AVCT is classified as Intangible assets, net in our consolidated balance sheets.

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

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

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

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

We grant performance-based stock units, some of which include a market condition, to certain of our executives and certain other employees. 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. We are required to record expense through the respective final vesting dates regardless of the number of shares that are ultimately earned. Once the grant date criteria have been met for a fiscal year performance period, we record stock-based compensation expense based on our assessment of the probability that the respective performance condition will be achieved and the level, if any, of such achievement. The Compensation Committee determines the number of shares earned, if any, after our financial results for each fiscal year performance period are finalized. Upon determination by the Compensation Committee of the number of shares that will be received upon vesting, such number of shares becomes fixed and the unamortized expense is recorded through the remainder of the service period, at which time any performance-based stock units earned will vest pending each executive's continued employment with us through that date.

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.

Preferred Stock and Warrants. We account for the Preferred Stock and Warrants as liability-classified instruments based on an assessment of their specific terms in accordance with ASC Topic 480, *Distinguishing Liabilities from Equity*. The fair value option was elected for the Preferred Stock, as we consider fair value to best reflect the expected future economic value. These liabilities are remeasured to fair value at each reporting date using the same valuation methodology applied upon issuance. The Preferred Stock is considered to be debt for our Consolidated Net Leverage Ratio covenant calculation required under our 2020 Credit Facility.

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.

We perform a fair value analysis for each reporting unit using both an income and market approach, which encompasses a discounted cash flow analysis and a guideline public company analysis using selected multiples. We assesse each valuation methodology based upon the relevance and availability of the data at the time the valuation is performed and the methodologies are weighted appropriately. Any impairment charges are reported separately in our consolidated statements of operations.

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

Our annual testing for impairment of goodwill is completed as of October 1. For the purpose of testing goodwill for impairment, all goodwill is assigned to a reporting unit, which may be either an operating segment or a portion of an operating segment. Our reporting units are our two operating segments, Cloud and Edge and IP Optical Networks. For our annual impairment testing, we perform a fair value analysis using both an Income and Market approach, which encompasses a discounted cash flow analysis and a guideline public company analysis using selected multiples. We assess each valuation methodology based upon the relevance and availability of the data at the time the valuation is performed and the methodologies are weighted appropriately.

Based upon the completion of our 2023 and 2022 annual test for goodwill impairment, we determined that there was no impairment of goodwill for either of our reporting units. The results of our 2021 impairment test determined that the carrying value of our IP Optical Networks segment exceeded its fair value. The amount of the impairment of $116.0 million was recorded in the fourth quarter of 2021 and is reported separately in our consolidated statement of operations for the year ended December 31, 2021. We determined that there was no impairment of our Cloud and Edge segment in 2021.

Leases. We account for our leases in accordance with Accounting Standards Codification ("ASC") 842, *Leases* ("ASC 842"). We have operating leases for corporate offices, and research and development facilities and historically had finance leases for certain equipment. Operating leases are reported separately in our consolidated balance sheets. Assets acquired under finance leases, if any, are included in Property and equipment, net, in the consolidated balance sheets.

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

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

Accounting for Income Taxes. Our provision for income taxes is comprised of both current taxes and deferred taxes. The current income tax provision is generally calculated as the estimated taxes payable or refundable on tax returns to be filed for the year ended December 31, 2023. We provide for deferred income taxes based on temporary differences between financial and taxable income, net operating loss carryforwards, tax credit carryforwards and any required valuation allowances.

We assess the recoverability of all deferred tax assets recorded on the balance sheet and provide any necessary valuation allowances as required. In evaluating our ability to realize 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 our business operations, and our forecast of future taxable income. In determining future taxable income, we make assumptions, including the amount of state, federal and international pre-tax 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.

We have provided for income taxes on the undistributed earnings of our non-U.S. subsidiaries as of December 31, 2023, excluding Ireland and Israel, which are indefinitely reinvested. Accordingly, we are required to recognize deferred taxes for 2023 on the outside basis differences related to the foreign subsidiaries, the largest of these differences being undistributed earnings.

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

Results of Operations

Years Ended December 31, 2023 and 2022

Revenue. Revenue for the years ended December 31, 2023 and 2022 was as follows (in thousands, except percentages):

	Year ended December 31,		Increase from prior year	
	2023	2022	$	%
Product	$ 445,150	$ 442,680	$ 2,470	0.6 %
Service	381,189	377,080	4,109	1.1 %
Total revenue	$ 826,339	$ 819,760	$ 6,579	0.8 %

Segment revenue for the years ended December 31, 2023 and 2022 was as follows (in thousands):

	Year ended December 31, 2023			Year ended December 31, 2022		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Product	$ 184,729	$ 260,421	$ 445,150	$ 215,770	$ 226,910	$ 442,68
Service	292,918	88,271	381,189	292,367	84,713	377,08
Total revenue	$ 477,647	$ 348,692	$ 826,339	$ 508,137	$ 311,623	$ 819,76

The increase in our product revenue in 2023 compared to 2022 was primarily the result of $33 million of higher sales of our IP Optical Networks products, offset by $31 million of lower sales of our Cloud and Edge products. The increase in revenue from the sale of IP Optical Networks products was primarily attributable to higher sales in India and the U.S. markets following the introduction of new products and capabilities, including support for Long Haul Optical Transport, 5G Cell Site Routers, and a new series of IP Routers. The decrease in revenue from the sale of Cloud and Edge products was primarily attributable to lower sales to U.S. Tier One service providers, partially offset by increased sales to Enterprise customers, including U.S. Federal agencies to support voice network modernization.

Revenue from sales to enterprise customers was 32% and 28% of our product revenue in 2023 and 2022, respectively. These sales were made through both our direct sales team and indirect sales channel partners.

Revenue from indirect sales through our channel partner program was 35% and 30% of our product revenue in 2023 and 2022, respectively. The increase in channel sales reflects stronger deployments through systems integrators as well as sell-through from our Service Provider channel partners.

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

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

Service revenue for the years ended December 31, 2023 and 2022 was comprised of the following (in thousands, except percentages):

	Year ended December 31,		Increase (decrease) from prior year	
	2023	2022	$	%
Maintenance	$ 279,653	$ 282,095	$ (2,442)	(0.9)%
Professional services	101,536	94,985	6,551	6.9 %
Total service revenue	$ 381,189	$ 377,080	$ 4,109	1.1 %

Segment service revenue for the years ended December 31, 2022 and 2021 was comprised of the following (in thousands):

	Year ended December 31, 2023			Year ended December 31, 2022		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Maintenance	$ 219,939	$ 59,714	$ 279,653	$ 222,238	$ 59,857	$ 282,09
Professional services	72,979	28,557	101,536	70,129	24,856	94,98
Total service revenue	$ 292,918	$ 88,271	$ 381,189	$ 292,367	$ 84,713	$ 377,08

Total service revenue from our Cloud and Edge segment was slightly higher in 2023 compared to 2022 due to a $3 million increase in professional services revenue and a decline in maintenance revenue. The increase in professional services revenue is related to the timing and completion of certain projects to both service providers and enterprise customers. The lower maintenance revenue reflects decommissioning of older equipment with several customers. Service revenue from our IP Optical Networks segment increased by 4.2% in 2023 compared to 2022, primarily due to an increase in projects driven by higher product sales.

The following customer contributed 10% or more of our revenue in the years ended December 31, 2023 and 2022:

	Year ended December 31,	
	2023	2022
Verizon Communications Inc.	11%	15%

Revenue earned from customers domiciled outside the United States was 58% and 57% of total revenue in 2023 and 2022, respectively. 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, 2023 and 2022 was disaggregated geographically as follows (in thousands):

Year ended December 31, 2023	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 161,945	$ 133,737	$ 48,733	$ 344,415
Europe, Middle East and Africa	151,938	75,478	34,485	261,901
Asia Pacific	115,923	39,891	11,269	167,083
Other	15,344	30,546	7,050	52,940
	$ 445,150	$ 279,652	$ 101,537	$ 826,339

Year ended December 31, 2022	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 175,189	$ 132,655	$ 44,819	$ 352,663
Europe, Middle East and Africa	147,523	75,948	29,310	252,781
Asia Pacific	95,828	41,677	13,594	151,099
Other	24,140	31,815	7,262	63,217
	$ 442,680	$ 282,095	$ 94,985	$ 819,760

Our deferred product revenue was $17 million at December 31, 2023 and $29 million at December 31, 2022. Our deferred service revenue was $116 million at December 31, 2023 and $104 million at December 31, 2022. 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 2024 will increase compared to our 2023 total revenue as our IP Optical sales continue to grow. From a regional perspective, we anticipate continued IP Optical revenue growth in 2024 from North America, Europe, the Middle East and Africa, and Central and Latin America. In the Cloud & Edge segment, we anticipate continued growth in Enterprise including U.S. Federal agencies, offsetting lower spending from U.S. service providers.

Cost of Revenue/Gross Margin. Our cost of revenue consists primarily of amounts paid to third-party manufacturers for purchased materials and services, royalties, amortization of acquired technology, inventory valuation adjustments, warranty costs, and manufacturing and services personnel and related costs. Our cost of revenue, gross profit and gross margin for the years ended December 31, 2023 and 2022 were as follows (in thousands, except percentages):

	Year ended December 31,		Increase (decrease) from prior year	
	2023	2022	$	%
Cost of revenue:				
Product	$ 250,609	$ 245,145	$ 5,464	2.2 %
Service	139,357	142,137	(2,780)	(2.0)%
Amortization of acquired technology	28,290	31,542	(3,252)	(10.3)%
Total cost of revenue	$ 418,256	$ 418,824	$ (568)	(0.1)%
Gross profit	$ 408,083	$ 400,936	$ 7,147	1.8 %
Gross margin	49.4 %	48.9 %		

Our segment cost of revenue, gross profit and gross margin for the years ended December 31, 2023 and 2022 were as follows (in thousands, except percentages):

	Year ended December 31, 2023			Year ended December 31, 2022		
	Cloud and Edge	IP Optical Networks	Total	Cloud and Edge	IP Optical Networks	Total
Product	$ 72,081	$ 178,528	$ 250,609	$ 80,570	$ 164,575	$ 245,145
Service	92,644	46,713	139,357	98,799	43,338	142,137
Amortization of acquired technology	12,904	15,386	28,290	18,471	13,071	31,542
Total cost of revenue	$ 177,629	$ 240,627	$ 418,256	$ 197,840	$ 220,984	$ 418,824
Gross profit	$ 300,018	$ 108,065	$ 408,083	$ 310,297	$ 90,639	$ 400,936
Gross margin	62.8 %	31.0 %	49.4 %	61.1 %	29.1 %	48.9 %

Our gross margin was slightly higher with a 0.5 percentage point increase in 2023 compared to 2022. This increase was the result of higher margins in both of our segments. The higher margin in our IP Optical segment was due to higher sales volume, favorable mix, lower product costs and royalties, and improved absorption of fixed costs from higher sales. The higher margin in our Cloud and Edge segment was primarily attributable to favorable product mix and lower product costs, including lower amortization of acquired technology costs.

We believe that our IP Optical Networks segment gross margin will improve in 2024 compared to 2023. Our overall consolidated gross margin may decrease in 2024 as a result of higher expected sales from IP Optical Networks, which has lower margins due to the higher hardware content in its products and higher production costs.

Research and Development. Research and development ("R&D") expenses consist primarily of salaries and related personnel expenses and prototype costs for the design, development, testing and enhancement of our products. R&D expenses for the years ended December 31, 2023 and 2022 were as follows (in thousands, except percentages):

Year ended December 31,		Decrease from prior year	
2023	2022	$	%
$ 190,660	$ 203,676	$ (13,016)	(6.4)%

The decrease in our research and development expenses in 2023 compared to 2022 was primarily attributable to approximately $8 million of lower expenses in our IP Optical Networks segment and approximately $5 million of lower expenses in our Cloud and Edge segment. The reduced expenses are a combination of lower employee headcount and outside subcontractors.

Our IP Optical Networks R&D investment is focused on significantly expanding our portfolio of IP Routing solutions, adding additional features and capabilities to our Optical Transport portfolio, and supporting features in our next generation SDN management and orchestration platform.

Some aspects of our R&D efforts require significant short-term expenditures, the timing of which may cause significant variability in our expenses. We believe that rapid technological innovation is critical to our long-term success, and we are tailoring our investments to meet the requirements of our customers and market. We believe that our R&D expenses will continue to decrease modestly in 2024, with reduced investment in both segments in areas such as sustaining engineering, as well as a full year benefit of the cost savings implemented in the 2023 Restructuring Plan.

Sales and Marketing. Sales and marketing expenses consist primarily of salaries and related personnel costs, commissions, travel and entertainment expenses, promotions, customer trial and evaluations inventory and other marketing and sales support expenses. Sales and marketing expenses for the years ended December 31, 2023 and 2022 were as follows (in thousands, except percentages):

Year ended December 31,		Decrease from prior year	
2023	2022	$	%
$ 137,460	$ 147,766	$ (10,306)	(7.0)%

The decrease in sales and marketing expenses in 2023 compared to 2022 was primarily a result of a global sales organization re-alignment that reduced management layers, as well as reduced investment in under-performing regions. In the year 2023 compared to 2022, this resulted in a reduction of expenses of approximately $7 million in our IP Optical Networks segment and approximately $3 million in our Cloud & Edge segment.

We believe that our sales and marketing expenses will be modestly lower in 2024 compared to 2023 as we continue to benefit from the realigned global sales structure and continue to implement additional efficiencies.

General and Administrative. General and administrative expenses consist primarily of salaries and related personnel costs for executive and administrative personnel, and audit, legal and other professional fees. General and administrative expenses for the years ended December 31, 2023 and 2022 were as follows (in thousands, except percentages):

Year ended December 31,		Increase from prior year	
2023	2022	$	%
$ 54,962	$ 51,053	$ 3,909	7.7 %

The increase in general and administrative expenses in 2023 compared to 2022 was primarily attributable to higher stock-based and other incentive compensation.

We believe that our general and administrative expenses in 2024 will increase slightly compared to our 2023 levels, primarily due to higher employee costs and as a result of inflation.

Amortization of Acquired Intangible Assets included in Operating expenses. Amortization of acquired intangible assets included in Operating expenses ("Opex Amortization") for the years ended December 31, 2023 and 2022 was as follows (in thousands, except percentages):

Year ended December 31,		Decrease from prior year	
2023	2022	$	%
$ 28,601	$ 29,646	$ (1,045)	(3.5)%

Opex Amortization was lower in 2023 compared to 2022 due to our method of amortization. We record our amortization in relation to expected future cash flows rather than on a straight-line basis. Accordingly, such expense may vary from one period to the next.

Acquisition-, Disposal- and Integration-Related. Acquisition-, disposal- and integration-related expenses include those expenses related to acquisitions that we would otherwise not have incurred. Acquisition- and disposal-related expenses include professional and services fees, such as legal, audit, consulting, paying agent and other fees. Integration-related expenses represent incremental costs related to combining our systems and processes with those of acquired businesses, such as third-party consulting and other third-party services.

We recorded $4.5 million of acquisition-, disposal- and integration-related expenses in 2023 compared to $6.3 million in 2022. These costs were related to integration following the ECI Acquisition and included license fees for systems in the process of being retired.

Restructuring and Related. We are 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 MD&A.

We recorded restructuring and related expense of $16.2 million in 2023, comprised of $9.9 million for severance and related costs, and $6.3 million for variable and other facilities-related costs, including $1.0 million of net expense for the accelerated amortization of lease assets. We recorded $10.8 million of restructuring and related expense in 2022, comprised of $5.3 million for severance and related costs, and $5.5 million for variable and other facilities-related costs, including $1.6 million of net expense for the accelerated amortization of lease assets. Although we have eliminated positions as part of our restructuring initiatives, we continue to hire in certain areas that we believe are important to our future growth.

Interest Expense, net. Interest expense and interest income for the years ended December 31, 2023 and 2022 were as follows (in millions, except percentages):

	Year ended December 31,		Increase from prior year	
	2023	2022	$	%
Interest income	$ 337	$ 232	$ 105	45.3 %
Interest expense	(27,657)	(20,012)	$ 7,645	38.2 %
Interest expense, net	$ (27,320)	$ (19,780)	$ 7,540	38.1 %

Interest income was nominal in 2023. Interest expense in 2023 was primarily comprised of costs related to the 2020 Credit Facility (as defined below), consisting of $25.5 million of interest on our term loan and revolver, $3.2 million of amortization of debt issuance costs, $0.5 million of which related to the March 2023 Sixth Amendment to the 2020 Credit Facility. We also incurred $4.3 million of fees related to factoring certain accounts receivable. Our interest expense, amortization of debt issuance costs, and factoring fees were partially offset by $5.6 million of amortization of gains in Accumulated other comprehensive income from the sales of our interest rate swap. Our interest expense for the years ended December 31, 2023 and 2022 benefited from our interest rate swap, which was sold in March 2023. See Note 14 to our consolidated financial statements.

Interest income was nominal in 2022. Interest expense in 2022 was primarily comprised of $16.0 million of interest on our outstanding term debt, $2.3 million in the aggregate related to amortization of debt issuance costs in connection with the 2020 Credit Facility (as defined below) and $1.7 million primarily related to factoring certain accounts receivable.

Other (Expense) Income, Net. We recorded other expense, net, aggregating $3.8 million in 2023, primarily comprised of the $5.3 million fair value adjustment of our Preferred Stock and Warrants, including dividends on the Preferred Stock, and $3.5 million of costs incurred in the Private Placement, partially offset by the gain of $7.3 million recognized from Accumulated other comprehensive income in connection with the sale of our interest rate swap. We recorded other expense, net of $44.5 million in 2022, primarily comprised of $41.3 million of losses resulting from the change in the fair value of the AVCT Investment.

Income Taxes. We recorded an income tax provision of $10.8 million and income tax benefit of $14.5 million in 2023 and 2022, respectively. The change from a tax benefit in 2022 to a tax provision in 2023 is a result of changes in the jurisdictional mix of pre-tax book income between those jurisdictions that have a valuation allowance and those that do not.

During 2023 and 2022, 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, in 2023, for the U.S. deferred tax assets, we concluded that deferred tax assets are generally realizable, with the exception of certain federal and state net operating loss carryforwards, as well as certain tax credits, that are not anticipated to be utilized. Accordingly, we have maintained a valuation allowance on our U.S. deferred tax assets of $23.9 million. As a result of our evaluations for Israel, we maintained a full valuation allowance against our net deferred tax assets in Israel.

The Organization for Economic Cooperation and Development (the "OECD") Pillar 2 global minimum tax rules are intended to apply for tax years beginning in 2024. On February 1, 2023, the FASB staff noted that they believe that the Pillar 2 tax would be an alternative minimum tax and therefore deferred tax assets would not need to be recognized related to this parallel taxing system. On February 2, 2023, the OECD issued administrative guidance providing transition and safe harbor rules around the implementation of the Pillar 2 global minimum tax. Under an additional transitional safe harbor released July 17, 2023, the undertaxed profits rule top-up tax will not be applied by any constituent entity's jurisdiction of residence with respect to income earned by a company's ultimate parent entity in its jurisdiction of residence, if the ultimate parent entity's jurisdiction has a corporate tax rate of at least 20%. This transition safe harbor will apply to fiscal years beginning on or before December 31, 2025 and ending before December 31, 2026. We are closely monitoring developments and evaluating the impacts these new rules will have on our tax rate, including eligibility to qualify for these safe harbor rules and do not expect Pillar 2 to have a significant impact on our financial statements.

Years Ended December 31, 2022 and 2021

For a comparison of our results of operations for the fiscal years ended December 31, 2022 and 2021, see "Part II, Item 7. MD&A" of our Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 31, 2023.

Off-Balance Sheet Arrangements

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

Liquidity and Capital Resources

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

	Year ended December 31,		
	2023	2022	Change
Net loss	$ (66,206)	$ (98,083)	$ 31,877
Adjustments to reconcile net loss to cash flows used in operating activities	79,209	122,052	(42,843)
Changes in operating assets and liabilities	4,084	(50,333)	54,417
Net cash provided by (used in) operating activities	$ 17,087	$ (26,364)	$ 43,451
Net cash used in investing activities	$ (9,481)	$ (12,136)	$ 2,655
Net cash (used in) provided by financing activities	$ (47,859)	$ 931	$ (48,790)

We had cash and cash equivalents aggregating $27 million and $67 million at December 31, 2023 and 2022, respectively. We had cash held by our non-U.S. subsidiaries aggregating approximately $16 million and $15 million at December 31, 2023 and 2022, respectively. If we elect to repatriate all of the funds held by our non-U.S. subsidiaries as of December 31, 2023, 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.

We currently maintain the Senior Secured Credit Facilities Credit Agreement (as amended, the "2020 Credit Facility"), which we entered into on March 3, 2020, by and among us, as a guarantor, Ribbon Communications Operating Company, Inc., as the borrower ("Borrower"), Citizens Bank, N.A. ("Citizens"), Santander Bank, N.A., and others as lenders, ("Lenders"). For additional details regarding the terms of the 2020 Credit Facility, see Note 14 to our consolidated financial statements.

On March 10, 2022, we entered into the Fourth Amendment to the 2020 Credit Facility to increase the Maximum Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility) and in conjunction we made a $15.0 million prepayment that was applied to the final payment due on the maturity date.

On June 30, 2022, we entered into the Fifth Amendment to the 2020 Credit Facility (the "Fifth Amendment") to increase the Maximum Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility) for 2022, with the fourth quarter of 2022 increased to 4.75:1.00. In the first and second quarters of 2023, the Maximum Consolidated Net Leverage Ratio allowed declined to 3.25:1.00 and in all subsequent quarters the ratio will be fixed at 3.00:1.00. Also, the Fifth Amendment reduced the minimum Consolidated Fixed Charge Coverage Ratio (as defined in the 2020 Credit Facility) in 2022, with the fourth quarter of 2022 reduced to 1.10:1.00 and in all subsequent quarters the ratio will be fixed at 1.25:1.00. In addition, the Fifth Amendment increased the maximum rate at which loans bear interest if our Consolidated Net Leverage Ratio for any quarter is greater than 4.50:1.00. Specifically, loans incurred were to bear interest, at our option, at either LIBOR plus a margin ranging from 1.50% to 4.50% per year, or the base rate plus 0.50%, or the prime rate plus a margin ranging from 0.50% to 3.50% per year. The Fifth

Amendment allowed us to incur junior secured or unsecured debt in an amount no less than $50 million, subject to certain conditions, including the requirement that 50% of the aggregate amount of such incurred debt (net of certain costs, fees and other amounts) must be applied to prepay the 2020 Credit Facility, and compliance with certain leverage ratio-based covenant exceptions. In connection with the Fifth Amendment, we made a $10.0 million voluntary prepayment that was applied to the final payment due on the maturity date. Subsequent to the Fifth Amendment, we are required to make quarterly principal payments on the 2020 Term Loan aggregating approximately $5.0 million per quarter through March 31, 2024 and $10.0 million in each of the three quarters thereafter, with the final payment due on the maturity date in March 2025.

On March 24, 2023, we entered into the Sixth Amendment to the 2020 Credit Facility (the “Sixth Amendment”) that was effective March 30, 2023. The Sixth Amendment, among other things, increased the Maximum Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility), with the first, second and third quarters of 2023 increasing to 4.50:1.00 and then decreasing to 4.25:1.00 and 4.00:1.00 in the fourth quarter of 2023 and the first quarter of 2024, respectively. In all subsequent quarters, the Maximum Consolidated Senior Net Leverage Ratio will be fixed at 3.00:1.00 and the Maximum Consolidated Net Leverage Ratio will be fixed at 4.00:1.00. Also, the Sixth Amendment reduced the minimum Consolidated Fixed Charge Coverage Ratio (as defined in the 2020 Credit Facility) to 1.10:1.00 through the first quarter of 2024 and in all subsequent quarters the ratio will be fixed at 1.25:1.00. The Sixth Amendment reduced the maximum borrowings allowed under the 2020 Revolving Credit Facility from $100 million to $75 million and the sublimit available for letters of credit was reduced from $30 million to $20 million. In addition, the Sixth Amendment replaced LIBOR with the Secured Overnight Financing Rate ("SOFR") as the alternative rate that may be used by us for calculating interest owed under the 2020 Credit Facility, with the margin now fixed at 4.5%. In conjunction with the Sixth Amendment, we made a $75 million prepayment that was applied to the final payment due upon maturity in March 2025 of approximately $200.3 million. The $75 million prepayment was almost entirely funded with the net proceeds from the Private Placement and the sales of our interest rate swap. Debt issuance costs associated with the Sixth Amendment totaled $1.7 million and are being amortized on a straight-line basis over the remaining life of the 2020 Credit Facility to Interest expense, net.

At December 31, 2023, we had an outstanding balance under the 2020 Term Loan of $235.4 million at an average interest rate of 10.0% and $2.7 million of letters of credit outstanding with an interest rate of 4.5%. At December 31, 2022, we had an outstanding balance under the 2020 Term Loan of $330.4 million at an average interest rate of 5.4% and $3.3 million of letters of credit outstanding with an interest rate of 4.5%. Our interest rates under our 2020 Term Loan benefited from a hedge instrument that was in place, specifically a fixed rate swap, until the instrument was sold in March 2023 (see Note 15). We were in compliance with all covenants of the 2020 Credit Facility at both December 31, 2023 and 2022, including the current Consolidated Net Leverage Ratio calculation that considers our debt to include Preferred Stock.

We use letters of credit, bank guarantees, and performance and bid bonds in the course of our business. At December 31, 2023, we had $7.9 million of letters of credit, bank guarantees, and performance and bid bonds outstanding (collectively, "Guarantees"), comprised of $2.7 million of letters of credit under the 2020 Credit Facility described above (the "Letters of Credit") and $5.2 million of bank guarantees and performance and bid bonds (collectively, the "Other Guarantees"). At December 31, 2022, we had $8.3 million of Guarantees, comprised of the $3.3 million of Letters of Credit and $5.0 million of Other Guarantees.

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

As a result of exposure to interest rate movements, during March 2020, we entered into an interest rate swap arrangement, which effectively converted our $400 million term loan with its variable interest rate based upon one-month LIBOR to an aggregate fixed rate of 0.904%, plus a leverage-based margin as defined in the 2020 Credit Facility. The swap was to mature on March 3, 2025, the same date the 2020 Credit Facility matures. On July 22, 2022, we sold $30 million of the notional amount of our interest rate swap back to our counterparty for $1.5 million, reducing the notional amount of this swap to $370 million. On August 16, 2022, we sold another $30 million of the notional amount of our interest rate swap back to our counterparty for $1.6 million, reducing the notional amount to $340 million, which approximated the term loan debt then outstanding. The gain in Accumulated other comprehensive income related to the $60 million notional amount sold of $3.1 million is being released into earnings on a straight-line basis over the remaining term of the 2020 Credit Facility as a decrease to interest expense, the amortization of which totaled $0.9 million for the year ended December 31, 2023. On March 24, 2023, we received $9.4 million, consisting of $0.4 million of interest and $9.0 million for the sale of $170 million of the $340 million notional amount of our interest rate swap back to our counterparty, reducing the notional amount to $170 million. On March 27, 2023, we received $9.8 million, consisting of $0.4 million of interest and $9.4 million for the sale of the remaining $170 million of our interest rate swap back to our counterparty. The portion of the gain in Accumulated other comprehensive income related to the term loan debt prepaid on the date of the final sale of our swap totaled $7.3 million and was released into earnings immediately as Other expense, net. The portion of the gain in Accumulated other comprehensive income related to our remaining term loan debt balance totaled $12.0 million and is being released into earnings on a straight-line basis over the remaining term of the 2020 Credit Facility as a decrease to interest expense, the amortization of which was $4.7 million for the year ended December 31, 2023.

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

The effective portion of changes in the fair value of designated derivatives that qualify as cash flow hedges is recorded in Accumulated other comprehensive income in the consolidated balance sheet and is subsequently reclassified into earnings in the period that the hedged forecasted transactions affect earnings. During the years ended December 31, 2023 and 2022, such a derivative was used to hedge the variable cash flows associated with the outstanding borrowings under the 2020 Credit Facility and we have accounted for this derivative as an effective hedge until the final portion of the swap was sold on March 27, 2023. Any ineffective portion of the change in fair value of the derivative was recognized directly in earnings. However, during the years ended December 31, 2023, 2022 and 2021, we recorded no hedge ineffectiveness. In the year ended December 31, 2023, we recorded $7.3 million of Other expense, net due to the sale of our interest rate swap arrangement.

Cash Flows from Operating Activities

Our primary source of cash from operating activities has been from cash collections from our customers. We expect cash flows from operating activities to be affected by increases and decreases in sales volumes and timing of collections, and by purchases and shipments of inventory. Our primary uses of cash from operating activities have been for personnel costs and investment in our research and development and in our sales and marketing, and general and administrative departments.

Our operating activities provided $17 million of cash in 2023, primarily resulting from our net loss, which was more than offset by certain non-cash expenses, such as amortization of intangible assets, stock-based compensation, depreciation and amortization of property and equipment, amortization of debt issuance costs and the change in the fair value of our preferred stock and warrant liabilities, including dividends on our preferred stock, partially offset by deferred income taxes and the gain on the sale of our interest rate swap. Also, the changes in our operating assets and liabilities provided operating cash, including lower other operating assets and accounts receivable, partially offset by lower accrued expenses and other long-term liabilities, higher inventory, and lower accounts payable. Higher product revenue in our IP Optical Networks segment and lower operating expenses company-wide due to our various cost saving initiatives, including lower employee and facilities expenses, have all positively affected our operating cash flow in 2023.

Our operating activities used $26 million of cash in 2022, primarily resulting from our net loss, lower accrued expenses and other long-term liabilities, and higher inventory. The decrease in accrued expenses and other long-term liabilities was primarily due to employee-related cash payments and payments related to facilities, professional fees and royalties. These amounts were partially offset by certain non-cash expenses, such as amortization of intangible assets, the decrease in the fair value of the AVCT Investment, stock-based compensation, as well as depreciation and amortization of property and equipment.

Cash Flows from Investing Activities

Our investing activities used $9 million and $12 million of cash in 2023 and 2022, respectively. Our 2023 investing activities were used to purchase property and equipment and software licenses. Our 2022 investing activities were comprised of $10 million paid for purchases of property and equipment, and $3 million paid for purchases of software licenses, partially offset by $1 million of proceeds from the sale of a business.

Cash Flows from Financing Activities

Our financing activities used $48 million of cash in 2023, primarily due to $95 million of principal payments on our term debt, including a $75 million prepayment in connection with the Sixth Amendment to the 2020 Credit Facility, $2 million of debt issuance costs also paid in connection with the Sixth Amendment, and $4 million for the payment of tax withholding related to the net share settlements of restricted stock awards upon vesting. In addition, we received $53 million of proceeds from the issuance of the Preferred Stock and Warrants in the Private Placement.

Our financing activities provided $1 million of cash in 2022, primarily due to $50 million of net proceeds from the private placement by us of 17,071,311 shares of our common stock, par value $0.0001 per share, at a price of $3.05 per share on August 12, 2022 (the "Equity Offering"), partially offset by $45 million of principal payments on the 2020 Credit Facility, including the voluntary $15 million incremental principal payment in connection with the Fourth Amendment and voluntary $10 million incremental principal payment in connection with the Fifth Amendment, and $3 million for the payment of tax withholding obligations related to the net share settlements of restricted stock awards upon vesting. Payments of debt issuance costs and principal payments of finance leases together totaled approximately $2 million.

Based on our current expectations, we believe our current cash balance, the cash generated from our operations, and borrowings available under the 2020 Credit Facility, will be sufficient to meet our anticipated cash needs for working capital and capital expenditures for at least twelve months from the date of issuance of these financial statements. The rate at which we consume cash is dependent on the cash needs of our future operations, including our contractual obligations at December 31, 2023, primarily comprised of our debt principal and interest obligations as described above, and our operating lease and purchase obligations. Our operating lease obligations totaled $65 million at December 31, 2023, with payments aggregating $19 million in 2024, $10 million in 2025, $9 million in 2026 and $27 million thereafter. Our purchase obligations totaled $114 million at December 31, 2023, with estimated payments aggregating $101 million in 2024 and $13 million thereafter. We anticipate devoting substantial capital resources to continue our research and development efforts, to maintain our sales, support and marketing, and for other general corporate activities. We further believe that our financial resources, along with managing discretionary expenses, will allow us to manage the ongoing impact of inflation and the supply chain disruptions on our business operations. Looking ahead, we have developed contingency plans to reduce costs further if the situation deteriorates. However, it is difficult to predict future liquidity requirements with certainty, and our cash and available borrowings under the 2020 Credit Facility may not be sufficient to meet our future needs, which would require us to refinance our debt and/or obtain additional financing. We may not be able to refinance our debt or obtain additional financing on favorable terms or at all.

Recent Accounting Pronouncements

In December 2023, the Financial Accounting Standards Board (the "FASB") issued ASU 2023-09, *Income Taxes (Topic 740): Improvements to Income Tax Disclosures* (“ASU 2023-09”), which increases the disclosure requirements around rate reconciliation information and certain types of income taxes companies are required to pay. ASU 2023-09 will be effective for us beginning in 2025, with early adoption permitted. We are currently evaluating the impact of this accounting standard update on our consolidated financial statements and related disclosures.

In November 2023, the FASB issued ASU 2023-07, *Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures* (“ASU 2023-07”), which improves reportable segment disclosure requirements, including enhancement of the disclosures of significant segment expenses and interim disclosure requirements, to enable investors to better understand an entity's overall performance and assess potential future cash flows. ASU 2023-07 will be effective for us annually beginning in 2024 and on an interim basis beginning in 2025, with early adoption permitted. We are currently evaluating the impact of this accounting standard update on our consolidated financial statements and related disclosures.

In October 2023, the FASB issued ASU 2023-06, *Disclosure Improvements: Codification Amendments in Response to the SEC's disclosure Update and Simplification Initiative* (“ASU 2023-06”), which amends the disclosure or presentation requirements related to various subtopics in the FASB Accounting Standards Codification. This ASU was issued in response to and to align GAAP with the SEC's August 2018 final rule that updates and simplifies disclosure requirements. The effective date for us for each amendment will be the date on which the SEC's removal of that related disclosure requirement becomes effective, with early adoption prohibited. We are currently evaluating the impact of this accounting standard update on our consolidated financial statements and related disclosures.

On February 1, 2023, the FASB staff noted that they believe that the Pillar 2 tax, established by the OECD and intended to apply for tax years beginning in 2024, would be an alternative minimum tax and therefore deferred tax assets would not need to be recognized related to this parallel taxing system. On February 2, 2023, the OECD issued administrative guidance providing transition and safe harbor rules around the implementation of the Pillar 2 global minimum tax. Under an additional transitional safe harbor released July 17, 2023, the undertaxed profits rule top-up tax will not be applied by any constituent entity's jurisdiction of residence with respect to income earned by a company's ultimate parent entity in its jurisdiction of residence, if the ultimate parent entity's jurisdiction has a corporate tax rate of at least 20%. This transition safe harbor will apply to fiscal years beginning on or before December 31, 2025 and ending before December 31, 2026. We are closely monitoring developments and evaluating the impacts these new rules will have on our tax rate, including eligibility to qualify for these safe harbor rules. Based upon preliminary calculations for calendar year 2024, we anticipate that we will meet the safe harbors in most jurisdictions, and any remaining top-up tax should be immaterial.

In March 2022, the Financial Accounting Standards Board (the "FASB") issued ASU 2022-02, *Financial Instruments – Credit Losses (Topic 326): Troubled Debt Restructurings and Vintage Disclosures* (“ASU 2022-02”), which eliminates the accounting guidance on troubled debt restructurings for creditors in ASC 310, *Receivables (Topic 310)*, and requires entities to provide disclosures about current period gross write-offs by year of origination. Also, ASU 2022-02 updates the requirements related to accounting for credit losses under ASC 326, *Financial Instruments – Credit Losses (Topic 326)*, and adds enhanced disclosures for creditors with respect to loan refinancings and restructurings for borrowers experiencing financial difficulty. ASU 2022-02 became effective for us January 1, 2023. The adoption of ASU 2022-02 did not have a material impact on our consolidated financial statements upon adoption.

In October 2021, the FASB issued ASU 2021-08, *Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers* ("ASU 2021-08"), which amends ASC 805, *Business Combinations (Topic 805)*, to add contract assets and contract liabilities to the list of exceptions to the recognition and measurement principles that apply to business combinations and to require that an acquiring entity recognize and measure contract assets and contract liabilities acquired in a business combination in accordance with ASC 606, *Revenue from Contracts with Customers (Topic 606)* ("ASC 606"). Under current GAAP, an acquirer generally recognizes such items at fair value on the acquisition date. While primarily related to contract assets and contract liabilities that were accounted for by the acquiree in accordance with ASC 606, ASU 2021-08 also applies to contract assets and contract liabilities from other contracts to which the provisions of ASC 606 apply, such as contract liabilities from the sale of nonfinancial assets within the scope of ASU 2017-05, *Other Income - Gains and Losses from the Derecognition of Nonfinancial Assets (Subtopic 610-20)*. ASU 2021-08 was effective for us January 1, 2023. We believe the adoption of ASU 2021-08 could have a material impact on our consolidated financial statements for periods including and subsequent to significant business acquisitions.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to market risk related to changes in interest rates and foreign currency exchange rates. The following discussion about these market risks includes forward-looking statements. Actual results could differ materially from those projected in these forward-looking statements.

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

In March 2023, we disposed of our interest rate swap by selling the remaining notional value totaling $340 million back to our counterparty. We received $19.2 million from our counterparty, consisting of $0.8 million of interest and $18.4 million for the sale and we recognized a gain from Accumulated other comprehensive income of $7.3 million to Other expense, net in our consolidated statement of operations. Amounts remaining in Accumulated other comprehensive income related to our derivative totaled $12.0 million and are being amortized to interest expense over the remaining term of our variable-rate debt on a straight-line basis.

At December 31, 2023, we had outstanding debt totaling $235.4 million. A hypothetical movement of plus or minus 50 basis points in the interest rate of our outstanding debt would have changed our interest expense by approximately $1 million for the year ended December 31, 2023.

Foreign Currency Exchange Risk. As a global company operating in more than 30 countries, a significant portion of our revenues and expenses are denominated in currencies other than the U.S. Dollar. If the U.S. Dollar strengthens against these other currencies, our revenue for these transactions reported in U.S. Dollars would decline and our non-U.S. Dollar expenses would be inversely impacted, resulting in lower U.S. Dollar expenses.

A hypothetical 10% strengthening of the U.S. Dollar would have negatively impacted our revenues for the year ended December 31, 2023 by approximately $18 million. Because a higher proportion of our expenses are denominated in foreign currencies compared to our revenue, our net loss for the year ended December 31, 2023 would have been positively impacted by approximately $19 million.

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, 2023 and 2022, the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows, for each of the three years in the period ended December 31, 2023, 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, 2023 and 2022, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2023, 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, 2023, 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, 2024, expressed an unqualified opinion on the Company's internal control over financial reporting.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current-period audit of the financial statements that were communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

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

Critical Audit Matter Description

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

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

How the Critical Audit Matter Was Addressed in the Audit

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

a. We tested the effectiveness of controls over revenue, including those over the determination of estimated standalone selling price.

a. We evaluated whether management's significant accounting policies related to the estimation of standalone selling price were appropriate.

a. With the assistance of our data analytics specialists, we evaluated the estimated standalone selling price analyses prepared by the Company, including testing the underlying detail of customer arrangements and the mathematical accuracy of the calculations.

Goodwill – Cloud and Edge and IP Optical Networks Reporting Units – Refer to Notes 2 and 10 to the financial statements

Critical Audit Matter Description

The Company's evaluation of goodwill for impairment involves the comparison of the fair value of each reporting unit to its carrying value. The Company used a combination of the income and market approaches to estimate reporting unit fair value. With respect to the income approach, management is required to make significant estimates and assumptions related to discount rates and forecasts of future revenue and profit margin. Changes in these assumptions could have a significant impact on either the fair value, the amount of any goodwill impairment charge, or both. The goodwill balance was $301 million as of December 31, 2023, of which $225 million was allocated to the Cloud and Edge Reporting unit and $76 million was allocated to the IP Optical Networks Reporting Unit ("IP Optical").

Given the significant judgments made by management to estimate the fair value of the Cloud and Edge and IP Optical Reporting Units, performing audit procedures to evaluate the reasonableness of management's estimates and assumptions related to the selection of the discount rate and forecasts of future revenue and profit margin required a high degree of auditor judgment and an increased extent of effort, including the need to involve our fair value specialists.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the discount rate and forecasts of future revenue and profit margin, used by management to estimate the fair value of the Cloud and Edge Reporting Unit and IP Optical Reporting Unit, included the following, among others:

a. We tested the effectiveness of controls over management's goodwill impairment evaluation, including those over the determination of the fair value of the Cloud and Edge Reporting Unit and IP Optical Reporting Unit, such as controls related to management's selection of the discount rate and forecasts of future revenue and profit margin.

a. We evaluated management's ability to accurately forecast future revenues and profit margin by comparing actual results to management's historical forecasts.

a. We evaluated the reasonableness of management's revenue and profit margin forecasts by comparing the forecasts to:
   i. Historical revenues and profit margins.
   ii. Internal communications to management and the Board of Directors.
   iii. Forecasted information included in Company press releases as well as in analyst and industry reports for the Company and certain of its peer companies.

a. With the assistance of our fair value specialists, we evaluated the reasonableness of the discount rate by:
   i. Testing the source information underlying the determination of the discount rate and the mathematical accuracy of the calculation.
   ii. Developing a range of independent estimates and comparing those to the discount rate selected by management.

/s/ Deloitte & Touche LLP

Dallas, Texas
February 28, 2024

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, 2023	December 31, 2022
Assets		
Current assets:		
Cash and cash equivalents	$ 26,630	$ 67,262
Accounts receivable, net	268,421	267,244
Inventory	77,521	75,423
Other current assets	46,146	68,057
Total current assets	418,718	477,986
Property and equipment, net	41,820	44,832
Intangible assets, net	238,087	294,728
Goodwill	300,892	300,892
Deferred income taxes	69,761	53,649
Operating lease right-of-use assets	39,783	44,888
Other assets	35,092	38,589
	$ 1,144,153	$ 1,255,564
Liabilities and Stockholders' Equity		
Current liabilities:		
Current portion of term debt	$ 35,102	$ 20,058
Accounts payable	85,164	95,810
Accrued expenses and other	91,687	85,270
Operating lease liabilities	15,739	15,416
Deferred revenue	113,381	113,939
Total current liabilities	341,073	330,493
Long-term debt, net of current	197,482	306,270
Warrant liability	5,295	—
Preferred stock liability, $0.01 par value per share; 10,000,000 shares authorized, 55,000 shares issued and outstanding at December 31, 2023 ($56,650 liquidation preference); none issued and outstanding at December 31, 2022	53,337	—
Operating lease liabilities, net of current	38,711	46,183
Deferred revenue, net of current	19,218	19,254
Deferred income taxes	5,616	3,750
Other long-term liabilities	30,658	31,187
Total liabilities	691,390	737,137
Commitments and contingencies (Note 26)		
Stockholders' equity:		
Common stock, 240,000,000 shares authorized, $0.0001 par value, 172,083,667 shares issued and outstanding at December 31, 2023; 168,324,995 shares issued and outstanding at December 31, 2022	17	17
Additional paid-in capital	1,958,909	1,941,569
Accumulated deficit	(1,519,950)	(1,453,744)
Accumulated other comprehensive income	13,787	30,585
Total stockholders' equity	452,763	518,427
	$ 1,144,153	$ 1,255,564

See notes to the consolidated financial statements.

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

	Year ended December 31,		
	2023	2022	2021
Revenue:			
Product	$ 445,150	$ 442,680	$ 453,042
Service	381,189	377,080	391,915
Total revenue	826,339	819,760	844,957
Cost of revenue:			
Product	250,609	245,145	214,745
Service	139,357	142,137	147,209
Amortization of acquired technology	28,290	31,542	38,343
Total cost of revenue	418,256	418,824	400,297
Gross profit	408,083	400,936	444,660
Operating expenses:			
Research and development	190,660	203,676	194,948
Sales and marketing	137,460	147,766	150,279
General and administrative	54,962	51,053	53,661
Amortization of acquired intangible assets	28,601	29,646	28,283
Impairment of goodwill	—	—	116,000
Acquisition-, disposal- and integration-related	4,476	6,286	7,632
Restructuring and related	16,209	10,833	11,653
Total operating expenses	432,368	449,260	562,456
Loss from operations	(24,285)	(48,324)	(117,796)
Interest expense, net	(27,320)	(19,780)	(15,831)
Other expense, net	(3,768)	(44,495)	(74,516)
Loss before income taxes	(55,373)	(112,599)	(208,143)
Income tax (provision) benefit	(10,833)	14,516	30,958
Net loss	$ (66,206)	$ (98,083)	$ (177,185)
Loss per share:			
Basic	$ (0.39)	$ (0.63)	$ (1.20)
Diluted	$ (0.39)	$ (0.63)	$ (1.20)
Shares used to compute loss per share:			
Basic	170,408	156,668	147,575
Diluted	170,408	156,668	147,575

See notes to the consolidated financial statements.

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

	Year ended December 31,		
	2023	2022	2021
Net loss	$ (66,206)	$ (98,083)	$ (177,185)
Other comprehensive income (loss), net of tax:			
Unrealized gain (loss) on interest rate swap, net of reclassifications and amortization into earnings	(10,015)	19,321	12,759
Reclassification of gain to other expense, net upon sale of interest rate swap	(5,099)	—	—
Foreign currency translation adjustments	(506)	(792)	(239)
Employee retirement benefits	(1,178)	4,478	—
Other comprehensive income (loss), net of tax	(16,798)	23,007	12,520
Comprehensive loss, net of tax	$ (83,004)	$ (75,076)	$ (164,665)

See notes to the consolidated financial statements.

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

	Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive (loss) income	Total stockholders' equity
	Shares	Amount				
Balances, January 1, 2021	**145,425,248**	**$ 15**	**$ 1,870,256**	**$ (1,178,476)**	**$ (4,942)**	**$ 686,853**
Exercise of stock options	13,815		24			24
Vesting of restricted stock awards and units	3,653,552					—
Vesting of performance-based stock units	1,557,656					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(1,754,963)		(14,464)			(14,464)
Stock-based compensation expense			19,418			19,418
Other comprehensive income					12,520	12,520
Net loss				(177,185)		(177,185)
Balances, December 31, 2021	**148,895,308**	**15**	**1,875,234**	**(1,355,661)**	**7,578**	**527,166**
Exercise of stock options	708		1			1
Vesting of restricted stock awards and units	3,075,543					—
Vesting of performance-based stock units	179,184					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(897,059)		(2,784)			(2,784)
Common stock issued in equity offering	17,071,311	2	52,065			52,067
Issuance costs related to equity offering			(1,654)			(1,654)
Stock-based compensation expense			18,707			18,707
Other comprehensive income					23,007	23,007
Net loss				(98,083)		(98,083)
Balances, December 31, 2022	**168,324,995**	**17**	**1,941,569**	**(1,453,744)**	**30,585**	**518,427**
Exercise of stock options	7,816		15			15
Vesting of restricted stock awards and units	4,840,738					—
Vesting of performance-based stock units	381,071					—
Shares of restricted stock returned to the Company under net share settlements to satisfy tax withholding obligations	(1,470,953)		(4,481)			(4,481)
Stock-based compensation expense			21,806			21,806
Other comprehensive loss					(16,798)	(16,798)
Net loss				(66,206)		(66,206)
Balances, December 31, 2023	**172,083,667**	**$ 17**	**$ 1,958,909**	**$ (1,519,950)**	**$ 13,787**	**$ 452,763**

See notes to the consolidated financial statements.

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

	Year ended December 31,		
	2023	2022	2021
Cash flows from operating activities:			
Net loss	$ (66,206)	$ (98,083)	$ (177,185)
Adjustments to reconcile net loss to cash flows (used in) provided by operating activities:			
Depreciation and amortization of property and equipment	14,105	15,295	16,962
Amortization of intangible assets	56,891	61,188	66,626
Amortization of debt issuance costs	3,241	2,308	4,763
Amortization of accumulated other comprehensive gain related to interest rate swap	(5,575)	—	—
Stock-based compensation	21,806	18,707	19,418
Impairment of goodwill	—	—	116,000
Deferred income taxes	(9,196)	(18,251)	(45,596)
Gain on sale of business	—	(62)	(2,772)
Decrease in fair value of investments	—	41,291	71,252
Gain on sale of swap	(7,301)	—	—
Change in fair value of warrant liability	(201)	—	—
Change in fair value of preferred stock liability	1,548	—	—
Dividends accrued on preferred stock liability	3,935	—	—
Foreign currency exchange losses	(44)	1,576	5,002
Changes in operating assets and liabilities:			
Accounts receivable	5,726	14,285	(47,279)
Inventory	(10,701)	(32,099)	(9,029)
Other operating assets	34,834	2,109	9,958
Accounts payable	(10,498)	(448)	34,482
Accrued expenses and other long-term liabilities	(14,684)	(37,635)	(50,324)
Deferred revenue	(593)	3,455	6,904
Net cash provided by (used in) operating activities	17,087	(26,364)	19,182
Cash flows from investing activities:			
Purchases of property and equipment	(9,381)	(10,254)	(17,132)
Purchases of software licenses	(100)	(3,300)	—
Proceeds from sale of business	—	1,418	2,944
Net cash used in investing activities	(9,481)	(12,136)	(14,188)
Cash flows from financing activities:			
Borrowings under revolving line of credit	97,000	73,625	—
Principal payments on revolving line of credit	(97,000)	(73,625)	—
Proceeds from issuance of long-term debt	—	—	74,625
Principal payments of term debt	(95,058)	(45,058)	(92,176)
Principal payments of finance leases	—	(595)	(903)
Payment of debt issuance costs	(1,685)	(1,046)	(789)
Proceeds from equity offering	—	52,067	—
Payment of equity offering issuance costs	—	(1,654)	—
Proceeds from issuance of preferred stock and warrant liabilities	53,350	—	—
Proceeds from the exercise of stock options	15	1	24
Payment of tax withholding obligations related to net share settlements of restricted stock awards	(4,481)	(2,784)	(14,464)
Net cash (used in) provided by financing activities	(47,859)	931	(33,683)
Effect of exchange rate changes on cash and cash equivalents	(379)	(1,654)	(523)
Net decrease in cash and cash equivalents	(40,632)	(39,223)	(29,212)
Cash and cash equivalents, beginning of year	67,262	106,485	135,697
Cash and cash equivalents, end of year	$ 26,630	$ 67,262	$ 106,485

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

	Year ended December 31,		
	2023	2022	2021
Supplemental disclosure of cash flow information:			
Interest paid	$ 25,573	$ 19,336	$ 14,867
Income taxes paid	$ 18,876	$ 16,988	$ 14,447
Income tax refunds received	$ 1,611	$ 1,251	$ 1,488
Supplemental disclosure of non-cash investing activities:			
Capital expenditures incurred, but not yet paid	$ 2,578	$ 2,559	$ 2,269
Inventory transfers to property and equipment	$ 1,693	$ 2,896	$ 676
Software license acquired through investment disposal	$ —	$ 1,886	$ —
Supplemental disclosure of non-cash financing activities:			
Total fair value of restricted stock awards, restricted stock units, and performance-based stock units on date vested	$ 15,571	$ 9,858	$ 40,751

See notes to the consolidated financial statements.

(1) NATURE OF THE BUSINESS

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

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

Basis of Presentation

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

Private Placement Offering

On March 28, 2023, the Company issued 55,000 shares of newly designated Series A Preferred Stock (the "Preferred Stock") to investors in a private placement offering at a price of $970 per share, along with 4.9 million warrants (the "Warrants") to purchase shares of the Company's common stock, par value $0.0001 per share (the "Private Placement"), at the exercise price of $3.77 per share. The proceeds from the Private Placement were approximately $53.4 million, including approximately $10 million from existing related party stockholders (See Note 16).

Equity Offering

On August 12, 2022, the Company entered into a Securities Purchase Agreement with certain investors for the sale (the "Equity Offering") in a private placement by the Company of 17,071,311 shares (the "Shares") of the Company's common stock, par value $0.0001 per share, at a price of $3.05 per share. The aggregate gross proceeds from the Equity Offering were approximately $52.1 million, including $10.0 million from existing related party shareholders, before deducting offering expenses paid by the Company of approximately $1.7 million.

The original issuance of the Shares in the Equity Offering was exempt from the registration requirements of the Securities Act of 1933, as amended (the "Securities Act"). The Company subsequently filed a registration statement on Form S-3 (the "Registration Statement") with the SEC registering the Shares, which Registration Statement was declared effective by the SEC on September 23, 2022.

Operating Segments

The Company's chief operating decision maker (the "CODM") is its president and chief executive officer. The CODM assesses the Company's performance based on the performance of two separate organizations within Ribbon: the Cloud and Edge segment ("Cloud and Edge") and the IP Optical Networks segment ("IP Optical Networks").

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 and the Preferred Stock and Warrants, intangible asset and goodwill valuations, including impairments, debentures and warrants, warranty accruals, 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, not affecting previously reported net income (loss), have been made to the previously issued financial statements to conform to the current year presentation.

Business Combinations

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

Revenue Recognition

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

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

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

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

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

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

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

Preferred Stock and Warrants

The Company accounts for the Preferred Stock and Warrants as liability-classified instruments based on an assessment of their specific terms in accordance with ASC Topic 480, *Distinguishing Liabilities from Equity*. The fair value option was elected for the Preferred Stock, as the Company considers fair value to best reflect the expected future economic value. These liabilities are remeasured to fair value at each reporting date using the same valuation methodology applied upon issuance. The Preferred Stock is considered to be debt for our Consolidated Net Leverage Ratio covenant calculation required under our 2020 Credit Facility.

The value of the Preferred Stock is calculated using the Black-Derman-Toy (BDT) stochastic yield lattice model to capture the optimal timing of repayment, increasing dividend rate and other features, and the value of the Warrants is calculated using the Black-Scholes Pricing Model.

Changes in the fair value of the Preferred Stock and Warrants are reported as Other expense, net in the Company's consolidated statements of operations.

Financial Instruments

The carrying amounts of the Company's cash equivalents, accounts receivable, accounts payable and borrowings under a revolving credit facility in the Consolidated Balance Sheets approximates fair value due to the immediate or short-term nature of these financial instruments. Ribbon's term debt balance as of December 31, 2023 and 2022 of $235.4 million and $330.4 million, respectively, had a fair value of approximately $235.1 million and $323.0 million, respectively. Our Preferred Stock and Warrants liabilities as of December 31, 2023 had a combined fair value of $58.6 million, including cumulative dividends on the Preferred Stock of $3.9 million.

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.

Fair Value Option - Investment in AVCT

The Company received debentures (the "Debentures") and warrants (the "AVCT Warrants") as sale consideration in connection with its December 1, 2020 sale of the Kandy Communications Business to American Virtual Cloud Technologies, Inc. ("AVCT") (the "Kandy Sale"). On September 8, 2021 (the "Debenture Conversion Date"), the Debentures were converted into 13,700,421 shares of AVCT common stock (the "Debenture Shares"). In connection with the conversion of the Debentures to the Debenture Shares, the Company elected to use the fair value option to account for its equity investment in AVCT as permitted under Accounting Standards Codification ("ASC") 825, *Financial Instruments* ("ASC 825"), which then refers to ASC 820, *Fair Value Measurement* ("ASC 820") to provide the fair value framework for valuing such investments. In accordance with ASC 820, the Company recorded the investment in AVCT at fair value, with changes in fair value recorded as a component of Other (expense) income, net, in the consolidated statements of operations. See Note 4 for a discussion of the valuation of the Debentures, AVCT warrants and Debenture Shares.

On August 29, 2022, the Company and AVCT entered into a settlement agreement which provided for, amongst other things, the cancellation of the Company's investment in the Debenture Shares and the AVCT Warrants with an aggregate fair value of $2.6 million. See Note 4 for a description of the settlement agreement with AVCT.

Transfers of Financial Assets

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

Factoring of accounts receivable and associated fees for the years ended December 31, 2023 and 2022 were as follows (in thousands):

	December 31,	
	2023	2022
Accounts receivable sold	$ 106,705	$ 74,523
Less factoring fees	(2,736)	(1,085)
Net cash proceeds	$ 103,969	$ 73,438

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 expense, net.

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

The Company records its foreign currency gains (losses) as a component of Other expense, net. The Company recognized net foreign currency losses of less than $0.1 million, $1.6 million and $5.0 million for the years ended December 31, 2023, 2022 and 2021, respectively.

Inventory

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

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

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

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 Loss from operations in the consolidated statement of operations. The Company reviews property and equipment for impairment in the same manner as intangible assets discussed below.

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

Intangible Assets and Goodwill

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

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

The Company's annual test for impairment of goodwill is completed as of October 1. For the purpose of testing goodwill for impairment, all goodwill is assigned to a reporting unit, which may either be an operating segment or a portion of an operating segment. The Company's reporting units are its two operating segments, Cloud and Edge and IP Optical Networks. The Company performs a fair value analysis for each reporting unit using both an income and market approach, which encompasses a discounted cash flow analysis and a guideline public company analysis using selected multiples. The Company assesses each valuation methodology based upon the relevance and availability of the data at the time the valuation is performed and the methodologies are weighted appropriately. Any impairment charges are reported separately in the Company's consolidated statements of operations.

Stock-Based Compensation

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

The Company uses the Black-Scholes valuation model for estimating the fair value of stock options on the grant date. 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 to certain of its executives and certain other employees performance-based stock units ("PSUs") that include a market condition. 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. 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. Once the grant date criteria have been met for a fiscal year performance period, the Company records stock-based compensation expense based on its assessment of the probability that the respective performance condition will be achieved and the level, if any, of such achievement. The Compensation Committee determines the number of shares earned, if any, after the Company's financial results for each fiscal year performance period are finalized. Upon the determination by the Compensation Committee of the number of shares that will be received upon vesting, such number of shares becomes fixed and the unamortized expense is recorded through the remainder of the service period, at which time any Performance PSUs earned, will vest pending each executive's continued employment with the Company through that date.

Concentration of Risk

The financial instruments that potentially subject Ribbon to concentrations of credit risk are cash and accounts receivable. The Company's cash equivalents were managed by one financial institution at December 31, 2023. 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 $1.2 million, $1.5 million and $1.6 million for the years ended December 31, 2023, 2022 and 2021, respectively.

Loss Contingencies and Reserves

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

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

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

Warranty

The Company records warranty liabilities for estimated costs of fulfilling its obligations under standard limited hardware and software warranties at the time of sale. The specific warranty terms and conditions vary depending upon the country in which the Company does business, but generally includes material costs, technical support, labor and associated overhead over a period ranging from one to three years. At December 31, 2023, the Company's liability for product warranties was $12.2 million of which $5.4 million was current and included in Accrued expenses and other and $6.8 million was long-term and included in Other long-term liabilities in the Company's consolidated balance sheet. At December 31, 2022, the Company's liability for product warranties was $11.9 million, of which $5.3 million was current and included in Accrued expenses and other, and $6.6 million was long-term and included in Other long-term liabilities in the Company's consolidated balance sheet.

Research and Development Grants

The Company records grants received from the Office of the Innovation Authority of the Israeli Ministry of Economics (the "IIA") as a reduction to Research and development expense. Royalties payable to the IIA are recognized pursuant to sales of related products and are included in Cost of revenue - product (see Note 26).

Accounting for Leases

The Company accounts for its leases in accordance with Accounting Standards Codification ("ASC") 842, *Leases* ("ASC 842") (see Note 21). The Company has operating leases for corporate offices, and research and development facilities. Operating leases are reported separately in the Company's consolidated balance sheets at December 31, 2023 and 2022. The Company has no finance leases as of December 31, 2023 or 2022.

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.

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

Accounting for Income Taxes

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

The Company has provided for income taxes on the undistributed earnings of its non-U.S. subsidiaries as of December 31, 2023, excluding Ireland and Israel, which are indefinitely reinvested. Accordingly, the Company is required to recognize and record deferred taxes for 2023 on the entire outside basis differences related to the foreign subsidiaries, the largest of these differences being undistributed earnings.

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 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

In December 2023, the Financial Accounting Standards Board (the "FASB") issued ASU 2023-09, *Income Taxes (Topic 740): Improvements to Income Tax Disclosures* (“ASU 2023-09”), which increases the disclosure requirements around rate reconciliation information and certain types of income taxes companies are required to pay. ASU 2023-09 will be effective for the Company beginning in 2025, with early adoption permitted. The Company is currently evaluating the impact of this accounting standard update on its consolidated financial statements and related disclosures.

In November 2023, the FASB issued ASU 2023-07, *Segment Reporting (Topic 280): Improvements to Reportable Segment Disclosures* (“ASU 2023-07”), which improves reportable segment disclosure requirements, including enhancement of the disclosures of significant segment expenses and interim disclosure requirements, to enable investors to better understand an entity's overall performance and assess potential future cash flows. ASU 2023-07 will be effective for the Company annually beginning in 2024 and on an interim basis beginning in 2025, with early adoption permitted. The Company is currently evaluating the impact of this accounting standard update on its consolidated financial statements and related disclosures.

In October 2023, the FASB issued ASU 2023-06, *Disclosure Improvements: Codification Amendments in Response to the SEC's disclosure Update and Simplification Initiative* (“ASU 2023-06”), which amends the disclosure or presentation requirements related to various subtopics in the FASB Accounting Standards Codification. This ASU was issued in response to and to align GAAP with the SEC's August 2018 final rule that updates and simplifies disclosure requirements. The effective date for the Company for each amendment will be the date on which the SEC's removal of that related disclosure requirement becomes effective, with early adoption prohibited. The Company is currently evaluating the impact of this accounting standard update on its consolidated financial statements and related disclosures.

On February 1, 2023, the FASB staff noted that they believe that the Pillar 2 tax, established by the OECD and intended to apply for tax years beginning in 2024, would be an alternative minimum tax and therefore deferred tax assets would not need to be recognized related to this parallel taxing system. On February 2, 2023, the OECD issued administrative guidance providing transition and safe harbor rules around the implementation of the Pillar 2 global minimum tax. Under an additional transitional safe harbor released July 17, 2023, the undertaxed profits rule top-up tax will not be applied by any constituent entity's jurisdiction of residence with respect to income earned by a company's ultimate parent entity in its jurisdiction of residence, if the ultimate parent entity's jurisdiction has a corporate tax rate of at least 20%. This transition safe harbor will apply to fiscal years beginning on or before December 31, 2025 and ending before December 31, 2026. We are closely monitoring developments and evaluating the impacts these new rules will have on our tax rate, including eligibility to qualify for these safe harbor rules. Based upon preliminary calculations for calendar year 2024, we anticipate that we will meet the safe harbors in most jurisdictions, and any remaining top-up tax should be immaterial.

In March 2022, the FASB issued ASU 2022-02, *Financial Instruments – Credit Losses (Topic 326): Troubled Debt Restructurings and Vintage Disclosures* (“ASU 2022-02”), which eliminates the accounting guidance on troubled debt restructurings for creditors in ASC 310, *Receivables (Topic 310)*, and requires entities to provide disclosures about current period gross write-offs by year of origination. Also, ASU 2022-02 updates the requirements related to accounting for credit losses under ASC 326, *Financial Instruments – Credit Losses (Topic 326)*, and adds enhanced disclosures for creditors with respect to loan refinancings and restructurings for borrowers experiencing financial difficulty. ASU 2022-02 was effective for the Company January 1, 2023. The adoption of ASU 2022-02 did not have a material impact on the Company's consolidated financial statements.

In October 2021, the FASB issued ASU 2021-08, *Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers* ("ASU 2021-08"), which amends ASC 805, *Business Combinations (Topic 805)*, to add contract assets and contract liabilities to the list of exceptions to the recognition and measurement principles that apply to business combinations and to require that an acquiring entity recognize and measure contract assets and contract liabilities acquired in a business combination in accordance with ASC 606, *Revenue from Contracts with Customers (Topic 606)* ("ASC 606"). Under current GAAP, an acquirer generally recognizes such items at fair value on the acquisition date. While primarily related to contract assets and contract liabilities that were accounted for by the acquiree in accordance with ASC 606, ASU 2021-08 also applies to contract assets and contract liabilities from other contracts to which the provisions of ASC 606 apply, such as contract liabilities from the sale of nonfinancial assets within the scope of ASU 2017-05, *Other Income - Gains and Losses from the Derecognition of Nonfinancial Assets (Subtopic 610-20)*. ASU 2021-08 was effective for the Company January 1, 2023. The Company believes that the adoption of ASU 2021-08 could have a material impact on its consolidated financial statements for periods including and subsequent to significant business acquisitions.

(3) BUSINESS ACQUISITIONS

On March 3, 2020, Ribbon completed its merger transaction with ECI Telecom Group Ltd ("ECI") in accordance with the terms of the Agreement and Plan of Merger, dated as of November 14, 2019 (the "ECI Acquisition"). Prior to the ECI Acquisition, ECI was a privately-held global provider of end-to-end packet optical transport and software-defined networking ("SDN") and network function virtualization solutions for service providers, enterprises and data center operators.

The ECI Acquisition was accounted for as a business combination and the financial results of ECI are included in the Company's consolidated financial statements. Costs related to the integration of the Company and ECI are included in the Acquisition-, disposal- and integration-related expenses in the table below.

Acquisition-, Disposal- and Integration-Related Expenses

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

The disposal-related expenses in the year ended December 31, 2022 primarily relate to costs incurred from the sale of one of our foreign subsidiaries. The disposal-related expenses in the year ended December 31, 2021 relate to the Kandy Sale (as defined below). The integration-related expenses in the years ended December 31, 2023, 2022 and 2021 relate to the ECI Acquisition.

The components of Acquisition-, disposal- and integration-related expenses incurred in the years ended December 31, 2023, 2022 and 2021 were as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Professional and services fees (acquisition-related)	$ —	$ —	$ 165
Professional and services fees (disposal-related)	—	414	329
Integration-related expenses	4,476	5,872	7,138
	$ 4,476	$ 6,286	$ 7,632

(4) SALE OF KANDY COMMUNICATIONS BUSINESS

The Company completed the Kandy Sale on December 1, 2020 (the "Kandy Sale Date"). As consideration, AVCT paid Ribbon $45.0 million, subject to certain adjustments, in the form of Debentures and AVCT Warrants (collectively the "AVCT Units"). The Company received 43,778 AVCT Units as sale consideration.

The Debentures bore interest at a rate of 10% per annum, which was added to the principal amount of the Debentures. The Debentures were subject to mandatory conversion if the AVCT stock price was at or above $6.00 per share for 40 trading days in any 60 consecutive trading day period, subject to the satisfaction of certain other conditions. As of February 19, 2021, the stock price had traded above $6.00 for 40 days within a 60 consecutive trading day period, and accordingly, on September 8, 2021 (the "Debenture Conversion Date"), upon the completion of customary regulatory filings by AVCT, the Debentures were converted into 13,700,421 shares of AVCT common stock (the "Debenture Shares").

The AVCT Warrants were independent of the Debentures and entitled the Company to purchase 4,377,800 shares of AVCT common stock at an exercise price of $0.01 per share.

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

The Company recorded a loss of $74.8 million in the year ended December 31, 2021 arising from the change in the fair value of the AVCT Investment. This loss was included as a component of Other expense net, in the Company's consolidated statements of operations. The Company recorded $3.5 million of interest income in the year ended December 31, 2021, which was added to the principal amount of the Debentures prior to the Debenture Conversion Date, and which is included in Interest expense, net, in the consolidated statement of operations.

On August 29, 2022, the Company and AVCT entered into a settlement agreement which provided for, amongst other things, the cancellation of the Company's investment in the Debenture Shares and the AVCT Warrants with an aggregate fair value of $2.6 million. Pursuant to the settlement agreement, the Company and AVCT also entered into a Wind Down Agreement, pursuant to which a Reseller Agreement between the parties, as previously amended, was terminated, and the Company was granted a non-exclusive perpetual license to use and modify certain intellectual property owned by AVCT comprising WebRTC gateway technology that is integrated with Ribbon’s SBCs and Application Servers. As consideration, the Company paid AVCT $2.5 million in cash, the Debenture Shares were redeemed and canceled, and the AVCT Warrants were terminated and canceled. The perpetual license granted by AVCT is classified as Intangible assets, net in the Company's consolidated balance sheet as of December 31, 2023 and 2022 in the amount of $2.4 million and $3.9 million, respectively.

The Company had no investment in AVCT as of December 31, 2023 or 2022 due to the settlement agreement entered into on August 29, 2022. The Company recorded losses of $41.3 million in the year ended December 31, 2022, representing the change in the fair value of the AVCT Investment.

The results of the Kandy Communications Business are excluded from the Company's consolidated results for all periods subsequent to the Kandy Sale Date.

(5) EARNINGS (LOSS) PER SHARE

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

The shares used to compute loss per share were as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Weighted average shares outstanding—basic	170,408	156,668	147,575
Potential dilutive common shares	—	—	—
Weighted average shares outstanding—diluted	170,408	156,668	147,575

Options to purchase the Company's common stock and unvested restricted and performance-based stock units aggregating 13.5 million shares, 14.5 million shares, and 10.6 million shares were excluded from the computation of diluted loss per share for the years ended December 31, 2023, 2022 and 2021, respectively, because their effect would have been antidilutive.

As of December 31, 2023, the potential number of dilutive shares from the Warrants totaled 4.9 million shares. However, there was no impact on weighted average shares outstanding from these Warrants for the year ended December 31, 2023 as the average share price of the Company's common stock was below the exercise price of $3.77 per share and their effect would have been antidilutive.

Dividends payable on the Preferred Stock are not an adjustment to net income (loss) used for the calculation of diluted earnings (loss) per share as these dividends are included in the fair value adjustment of the Preferred Stock which is reflected in Other expense, net.

(6) FAIR VALUE HIERARCHY

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. The Company had no assets or liabilities fair valued using Level 1 input at December 31, 2023 or 2022.

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). At December 31, 2023, the Company determined the fair value of its defined benefit plans' assets using Level 2 input. At December 31, 2022, the Company determined the fair value of its interest rate swap and its defined benefit plans' assets using Level 2 input.

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. At December 31, 2023, the fair value of the Company's Preferred Stock and Warrants were determined using Level 3 input. The Company had no assets or liabilities fair valued using Level 3 input at December 31, 2023 or 2022.

(7) ACCOUNTS RECEIVABLE, NET

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

	December 31, 2023	December 31, 2022
Accounts receivable	$ 269,933	$ 268,671
Allowance for doubtful accounts	(1,512)	(1,427)
Accounts receivable, net	$ 268,421	$ 267,244

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

Year ended December 31,	Balance at beginning of year	Charges to expense	Charges (credits) to other accounts	Write-offs	Balance at end of year
2023	$ 1,427	$ 428	$ 143	$ (486)	$ 1,512
2022	$ 1,270	$ 100	$ 159	$ (102)	$ 1,427
2021	$ 776	$ 553	$ 85	$ (144)	$ 1,270

(8) INVENTORY

Inventory consisted of the following (in thousands):

	December 31, 2023	December 31, 2022
On-hand final assemblies and finished goods inventories	$ 93,077	$ 85,888
Deferred cost of goods sold	3,269	1,449
	96,346	87,337
Less noncurrent portion (included in Other assets)	(18,825)	(11,914)
Current portion	$ 77,521	$ 75,423

(9) PROPERTY AND EQUIPMENT

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

	Useful Life	December 31, 2023	December 31, 2022
Equipment	2-5 years	$ 77,205	$ 76,674
Software	2-5 years	34,802	33,639
Furniture and fixtures	3-5 years	3,301	3,168
Leasehold improvements	Shorter of the estimated lease term or useful life	36,383	35,448
		151,691	148,929
Less accumulated depreciation and amortization		(109,871)	(104,097)
Property and equipment, net		$ 41,820	$ 44,832

The Company recorded depreciation and amortization expense related to property and equipment of $14.1 million for the year ended December 31, 2023, $15.3 million for the year ended December 31, 2022 and $17.0 million for the year ended December 31, 2021. During each of these years, 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.

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

	December 31, 2023	December 31, 2022
United States	$ 20,807	$ 23,143
Canada	3,175	3,471
Asia/Pacific	8,314	8,152
Europe	957	833
Israel	8,309	8,860
Other	258	373
	$ 41,820	$ 44,832

(10) INTANGIBLE ASSETS AND GOODWILL

The Company's intangible assets at December 31, 2023 and 2022 consisted of the following (in thousands):

December 31, 2023	Weighted average amortization period (years)	Cost	Accumulated amortization	Net carrying value
Developed technology	7.84	$ 340,380	$ 239,066	$ 101,314
Customer relationships	11.86	268,140	134,743	133,397
Trade names	3.88	5,000	4,901	99
Software licenses	3.00	5,436	2,159	3,277
	9.51	$ 618,956	$ 380,869	$ 238,087

December 31, 2022	Weighted average amortization period (years)	Cost	Accumulated amortization	Net carrying value
Developed technology	7.84	$ 340,380	$ 212,448	$ 127,932
Customer relationships	11.86	268,140	106,385	161,755
Trade names	3.88	5,000	4,658	342
Software licenses	3.00	5,186	487	4,699
	9.51	$ 618,706	$ 323,978	$ 294,728

Estimated future amortization expense for the Company's intangible assets at December 31, 2023 was as follows (in thousands):

Years ending December 31,	
2024	$ 50,800
2025	44,089
2026	39,039
2027	33,935
2028	23,400
Thereafter	46,824
	$ 238,087

Goodwill is recorded when the consideration for an acquisition exceeds the fair value of net tangible and identifiable intangible assets acquired. For the purpose of testing goodwill for impairment, all goodwill is assigned to a reporting unit, which may be either an operating segment or a portion of an operating segment. The Company's reporting units are its two operating segments, Cloud and Edge and IP Optical Networks. Annual testing for impairment of goodwill is completed as of October 1.

Upon completion of the 2023 and 2022 annual tests for goodwill impairment, the Company determined that there was no impairment of goodwill in either of its reporting units. There was no change in the carrying value of the Company's goodwill in the years ended December 31, 2022 and 2023.

The components of goodwill at December 31, 2022 and 2023 were as follows (in thousands):

	Cloud and Edge	IP Optical Networks	Total
Balance at December 31, 2022			
Goodwill	$ 392,302	$ 191,996	$ 584,29
Accumulated impairment losses	(167,406)	(116,000)	(283,40
	224,896	75,996	300,89
Balance at December 31, 2023			
Goodwill	$ 392,302	$ 191,996	$ 584,29
Accumulated impairment losses	(167,406)	(116,000)	(283,40
	$ 224,896	$ 75,996	$ 300,89

(11) ACCRUED EXPENSES AND OTHER

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

	December 31, 2023	December 31, 2022
Employee compensation and related costs	$ 33,682	$ 25,994
Professional fees	19,702	17,195
Taxes payable	8,383	8,152
Other	29,920	33,929
	$ 91,687	$ 85,270

(12) WARRANTY

The changes in the Company's warranty accrual balance in the years ended December 31, 2023 and 2022 were as follows (in thousands):

Year ended December 31,	Balance at beginning of year	Provision	Settlements	Balance at end of year
2023	$ 11,857	$ 5,875	$ (5,489)	$ 12,243
2022	$ 13,120	$ 4,605	$ (5,868)	$ 11,857

(13) RESTRUCTURING AND FACILITIES CONSOLIDATION INITIATIVES

The Company recorded restructuring and related expense aggregating $16.2 million, $10.8 million and $11.7 million in the years ended December 31, 2023, 2022 and 2021, respectively. Restructuring and related expense includes restructuring expense (primarily severance and related costs), estimated future variable and other lease costs for vacated properties with no intent or ability of sublease, and accelerated rent amortization expense.

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

Accelerated amortization of lease assets is recognized from the date that the Company commences the plan to fully or partially vacate a facility, for which there is no intent or ability to enter into a sublease, through the final vacate date. Amounts of accelerated rent amortization that are included as a component of restructuring and related expense are not included in the tables below, as the liability for the total lease payments for each respective facility is included as a component of Operating lease liabilities in the Company's consolidated balance sheets at December 31, 2023 and 2022, both current and noncurrent (see Note 21). The Company may incur additional future expense if it is unable to sublease other locations included in the Facilities Initiative.

The components of restructuring and related expense for the years ended December 31, 2023, 2022 and 2021 were as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Severance and related costs	$ 9,875	$ 5,230	$ 4,618
Variable and other facilities-related costs	5,326	3,992	5,710
Accelerated amortization of lease assets due to cease-use	1,008	1,611	1,325
	$ 16,209	$ 10,833	$ 11,653

2023 Restructuring Plan

On February 22, 2023, the Company's Board of Directors approved a strategic restructuring program (the "2023 Restructuring Plan") to streamline the Company's operations in order to support the Company's investment in critical growth areas. The 2023 Restructuring Plan includes, among other things, charges related to a workforce reduction. Any potential positions eliminated in countries outside the United States are subject to local law and consultation requirements.

The Company recorded restructuring and related expense of $9.9 million in 2023 in connection with the 2023 Restructuring Plan entirely for severance related costs. A summary of the 2023 Restructuring Plan accrual activity for the year ended December 31, 2023 is as follows (in thousands):

	Balance at January 1, 2023	Initiatives charged to expense	Cash payments	Net transfer to operating lease accounts	Balance at December 31, 2023
Severance	$ —	$ 9,875	$ (9,204)	$ —	$ 671

The Company estimates that it will record nominal future expense under the 2023 Restructuring Plan.

2022 Restructuring Plan

On February 14, 2022, the Company's Board of Directors approved a strategic restructuring program (the "2022 Restructuring Plan") to streamline the Company's operations in order to support the Company's investment in critical growth areas. The 2022 Restructuring Plan includes, among other things, charges related to a consolidation of facilities and a workforce reduction. Any positions eliminated in countries outside the United States are subject to local law and consultation requirements.

The Company recorded restructuring and related expense of $6.3 million and $10.2 million in connection with the 2022 Restructuring Initiative in the years ended December 31, 2023 and 2022, respectively. The amount for the year ended December 31, 2023 was comprised of $5.3 million for variable and other facilities-related costs and $1.0 million for accelerated amortization of lease assets no longer being used with no ability or intent to sublease. The amount for the year ended December 31, 2022 was comprised of $5.3 million for severance and related costs for approximately 70 employees, $3.3 million for variable and other facilities-related costs and $1.6 million for accelerated amortization of lease assets no longer being used with no ability or intent to sublease. The Company estimates that it will record approximately $5 million of expense in 2024 under the 2022 Restructuring Plan. A summary of the 2022 Restructuring Plan accrual activity for the years ended December 31, 2023 and 2022 are as follows (in thousands):

	Balance at January 1, 2023	Initiatives charged to expense	Cash payments	Net transfer to operating lease accounts	Balance at December 31, 2023
Severance	$ 1,164	$ —	$ (1,164)	$ —	$ —
Variable and other facilities-related costs	890	5,326	(5,748)	—	468
Accelerated amortization of lease assets due to cease-use	—	1,008	—	(1,008)	—
	$ 2,054	$ 6,334	$ (6,912)	$ (1,008)	$ 468

	Balance at January 1, 2022	Initiatives charged to expense	Cash payments	Net transfer to operating lease accounts	Balance at December 31, 2022
Severance	$ —	$ 5,287	$ (4,123)	$ —	$ 1,164
Variable and other facilities-related costs	—	3,299	(2,409)	—	890
Accelerated amortization of lease assets due to cease-use	—	1,611	—	(1,611)	—
	$ —	$ 10,197	$ (6,532)	$ (1,611)	$ 2,054

Balance Sheet Classification

The current portions of accrued restructuring were $1.1 million and $1.3 million at December 31, 2023 and 2022, respectively, and are included as components of Accrued expenses in the consolidated balance sheets. The long-term portions of accrued restructuring are included as components of Other long-term liabilities in the consolidated balance sheets. The long-term portions of accrued restructuring were $1.1 million and $2.0 million at December 31, 2023 and 2022, respectively.

(14) DEBT

2020 Credit Facility

On March 3, 2020, the Company entered into a Senior Secured Credit Facilities Credit Agreement (as amended, the "2020 Credit Facility"), by and among the Company, as a guarantor, Ribbon Communications Operating Company, Inc., as the borrower ("Borrower"), Citizens Bank, N.A. ("Citizens"), Santander Bank, N.A., and others as lenders, ("Lenders"). The proceeds of the Credit Agreement were used, in part, to pay off in full all obligations of the Company under the 2019 Credit Facility.

The 2020 Credit Facility originally provided for $500 million of commitments from the Lenders to the Borrower, comprised of $400 million in term loans (the "2020 Term Loan Facility") and a $100 million facility available for revolving loans (the "2020 Revolving Credit Facility"). Under the 2020 Revolving Credit Facility, a $30 million sublimit was originally available for letters of credit and a $20 million sublimit is available for swingline loans.

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

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

On August 18, 2020, the Company entered into the First Amendment to the 2020 Credit Facility in which $75 million of the 2020 Term Loan Facility was assigned from Citizens to a new lender and designated as the Term B Loan. The remaining $325 million of the 2020 Term Loan Facility was deemed the Term A Loan.

The Term A Loan and the 2020 Revolving Credit Facility mature in March 2025 and originally bore interest at the Borrower's option at either the LIBOR rate plus a margin ranging from 1.50% to 3.50% per year, or the base rate plus 0.50%, or the prime rate plus a margin ranging from 0.50% to 2.50% per year (the "Applicable Margin"). The Applicable Margin varied depending on the Company's Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility).

The Term B Loan was scheduled to mature in March 2026 and bore interest, at the Borrower's option, at either the LIBOR rate plus a margin of 7.50% per year, or the base rate (the highest of the Federal Funds Effective Rate (as defined in the First Amendment) plus 0.50%, or the prime rate.

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

On March 3, 2021, the Company entered into the Third Amendment to the 2020 Credit Facility which provided for an incremental term loan facility in the principal amount of $74.6 million, the proceeds of which were used to consummate an open market purchase of all outstanding amounts under the Term B Loan, resulting in the assignment and immediate cancellation of the Term B Loan, such that the outstanding amount under the Term A Loan and incremental term loan facility were combined and held by the Lenders (the "2020 Term Loan") with the same terms as the Term A Loan. The Company wrote off $2.5 million of capitalized debt issuance costs in connection with the Third Amendment, which is included in Interest expense, net, in the Company's consolidated statement of operations for the year ended December 31, 2021.

On March 10, 2022, the Company entered into the Fourth Amendment to the 2020 Credit Facility to increase the Maximum Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility) and in conjunction, the Company made a $15.0 million prepayment that was applied to the final payment due on the maturity date.

On June 30, 2022, the Company entered into the Fifth Amendment to the 2020 Credit Facility (the "Fifth Amendment") to increase the Maximum Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility) for 2022, with the fourth quarter of 2022 increased to 4.75:1.00, the first and second quarters of 2023 declining to 3.25:1.00, and in all subsequent quarters the ratio was to be fixed at 3.00:1.00. Also, the Fifth Amendment reduced the minimum Consolidated Fixed Charge Coverage Ratio (as defined in the 2020 Credit Facility) in 2022, with the fourth quarter of 2022 reduced to 1.10:1.00 and in all subsequent quarters the ratio was to be fixed at 1.25:1.00. In addition, the Fifth Amendment increased the maximum rate at which loans were to bear interest if the Company's Consolidated Net Leverage Ratio for any quarter was greater than 4.50:1.00. Specifically, loans incurred were to bear interest, at the Borrower’s option, at either LIBOR plus a margin ranging from 1.50% to 4.50% per year, or the base rate plus 0.50%, or the prime rate plus a margin ranging from 0.50% to 3.50% per year. The Fifth Amendment also allowed the Company to incur junior secured or unsecured debt in an amount no less than $50 million, subject to certain conditions, including the requirement that 50% of the aggregate amount of such incurred debt (net of certain costs, fees and other amounts) must be applied to prepay the 2020 Credit Facility, and compliance with certain leverage ratio-based covenant exceptions. In connection with the Fifth Amendment, the Company made a $10.0 million voluntary prepayment that was applied to the final payment due on the maturity date. Subsequent to the Fifth Amendment, the Company is required to make quarterly principal payments on the 2020 Term Loan aggregating approximately $5.0 million per quarter through March 31, 2024 and $10.0 million in each of the three quarters thereafter, with the remaining and final payment due on the maturity date in March 2025.

On March 24, 2023, the Company entered into the Sixth Amendment to the 2020 Credit Facility (the “Sixth Amendment”) effective March 30, 2023. The Sixth Amendment, among other things, increased the Maximum Consolidated Net Leverage Ratio (as defined in the 2020 Credit Facility), with the first, second and third quarters of 2023 increasing to 4.50:1.00 and then decreasing to 4.25:1.00 and 4.00:1.00 in the fourth quarter of 2023 and the first quarter of 2024, respectively. In all subsequent quarters, the Maximum Consolidated Senior Net Leverage Ratio will be fixed at 3.00:1.00 and the Maximum Consolidated Net Leverage Ratio will be fixed at 4.00:1.00. Also, the Sixth Amendment reduced the minimum Consolidated Fixed Charge Coverage Ratio (as defined in the 2020 Credit Facility) to 1.10:1.00 through the first quarter of 2024 and in all subsequent quarters the ratio will be fixed at 1.25:1.00. The Sixth Amendment reduced the maximum borrowings allowed under the 2020

Revolving Credit Facility from $100 million to $75 million and the sublimit available for letters of credit was reduced from $30 million to $20 million. In addition, the Sixth Amendment replaced LIBOR with the Secured Overnight Financing Rate ("SOFR") as the alternative rate that may be used by the Company for calculating interest owed under the 2020 Credit Facility, with the margin now fixed at 4.5%. In conjunction with the Sixth Amendment, the Company made a $75 million prepayment that was applied to the final payment due upon maturity in March 2025 of approximately $200.3 million. The $75 million prepayment was almost entirely funded with the net proceeds from the Private Placement and the sales of our interest rate swap. Debt issuance costs associated with the Sixth Amendment totaled $1.7 million and are being amortized on a straight-line basis over the remaining life of the 2020 Credit Facility to Interest expense, net.

The Company's interest rates under the 2020 Term Loan benefited from a hedge instrument that was in place, specifically a fixed rate swap, until the instrument was sold in March 2023 (see Note 15). As a result of the sale of the fixed rate swap, the ongoing interest rate is now based upon U.S. dollar SOFR, plus a fixed margin of 4.5%. The Company was in compliance with all covenants of the 2020 Credit Facility at both December 31, 2023 and 2022, including the current Consolidated Net Leverage Ratio calculation that considers the Company's debt to include Preferred Stock.

The Company had the following outstanding borrowings, unamortized debt issuance costs, letters of credit, interest rates, and remaining borrowing capacity under the 2020 Credit Facility as of December 31, 2023 and 2022, respectively:

	December 31, 2023	December 31, 2022
Current portion of Term Debt	$ 35,102	$ 20,058
Long-term Debt, net of Current:		
Long-term Debt, net of Current (Face Amount)	$ 200,293	$ 310,395
Unamortized Debt Issuance Costs - Contra-Liability	(2,811)	(4,125)
Long-term Debt, net of Current	$ 197,482	$ 306,270
Total Face Amount of Borrowings	$ 235,395	$ 330,453
Unamortized Debt Issuance Costs:		
Other Assets	$ 557	$ 798
Long-Term Debt - Contra Liability	2,811	4,125
Total Unamortized Debt Issuance Costs	$ 3,368	$ 4,923
Letters of Credit Outstanding	$ 2,711	$ 3,272
Remaining Borrowing Capacity	$ 72,289	$ 96,728
Average Interest Rates:		
Term Loan	10.0 %	5.4 %
Letters of Credit	4.5 %	4.5 %

The Company's debt maturities as of December 31, 2023 were as follows:

Years ending December 31,	
2024	35,102
2025	200,293
	235,395

Letters of Credit and Performance and Bid Bonds

The Company uses letters of credit, bank guarantees, and performance and bid bonds in the course of its business. At December 31, 2023, the Company had $7.9 million of letters of credit, bank guarantees, and performance and bid bonds outstanding (collectively, "Guarantees"), comprised of the $2.7 million of letters of credit under the 2020 Credit Facility described above (the "Letters of Credit") and $5.2 million of bank guarantees and performance and bid bonds (collectively, the "Other Guarantees") under various uncommitted facilities. At December 31, 2022, the Company had Guarantees aggregating $8.3 million, comprised of the $3.3 million of Letters of Credit and $5.0 million of Other Guarantees.

(15) DERIVATIVE INSTRUMENTS AND HEDGING ACTIVITIES

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

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

Cash Flow Hedge of Interest Rate Risk

The 2020 Term Loan Facility had outstanding balances of $235.4 million and $330.4 million at December 31, 2023 and 2022, respectively. The 2020 Revolving Credit Facility was undrawn at both December 31, 2023 and 2022. Borrowings under the 2020 Credit Facility have variable interest rates based on LIBOR or SOFR (see Note 14). As a result of exposure to interest rate movements, during March 2020, the Company entered into an interest rate swap arrangement, which effectively converted its $400 million term loan with its variable interest rate based upon one-month LIBOR to an aggregate fixed rate of 0.904%, plus a leverage-based margin as defined in the 2020 Credit Facility.

On July 22, 2022, the Company sold $30 million of the notional amount of its interest rate swap back to its counterparty for $1.5 million, reducing the notional amount of this swap to $370 million. On August 16, 2022 the Company sold another $30 million of the notional amount of its interest rate swap back to its counterparty for $1.6 million, reducing the notional amount to $340 million, which approximated the current level of our term loan debt then outstanding. The gain in Accumulated other comprehensive income related to the $60 million notional amount sold of $3.1 million is being released into earnings on a straight-line basis over the remaining term of the 2020 Credit Facility as a decrease to interest expense, the amortization of which totaled $0.9 million and $0.5 million for the years ended December 31, 2023 and 2022.

On March 24, 2023, the Company received $9.4 million, consisting of $0.4 million of interest and $9.0 million for the sale of $170 million of its $340 million notional amount interest rate swap back to its counterparty, reducing the notional amount to $170 million. On March 27, 2023, the Company received $9.8 million, consisting of $0.4 million of interest and $9.4 million for the sale of the remaining $170 million of its interest rate swap back to its counterparty. The portion of the gain in Accumulated other comprehensive income related to the term loan debt prepaid on the date of the final sale of our swap totaled

$7.3 million and was released into earnings immediately as Other expense, net. The portion of the gain in Accumulated other comprehensive income related to our remaining term loan debt balance was $12.0 million and is being released into earnings on a straight-line basis over the remaining term of the 2020 Credit Facility as a decrease to interest expense, the amortization of which totaled $4.7 million for the year ended December 31, 2023.

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

The effective portion of changes in the fair value of designated derivatives that qualify as cash flow hedges is recorded in Accumulated other comprehensive income in the consolidated balance sheet and is subsequently reclassified into earnings in the period that the hedged forecasted transactions affect earnings. During the years ended December 31, 2023 and 2022, such a derivative was used to hedge the variable cash flows associated with the credit facilities under the 2020 Credit Facility, and the Company has accounted for this derivative as an effective hedge until the final portion of the swap was sold on March 27, 2023. Any ineffective portion of the change in the fair value of the derivative was recognized directly in earnings.

Amounts reported in Accumulated other comprehensive income related to the Company's derivative are reclassified to interest expense as interest is accrued on the Company's variable-rate debt. The impact of the Company's derivative financial instrument on its consolidated statement of comprehensive (loss) income for the years ended December 31, 2023 and 2022 was as follows, net of tax (in thousands):

	Year ended December 31,	
	2023	2022
Gain (loss) recognized in other comprehensive income (loss) on swap, net of tax	$ (2,715)	$ 22,456
Amount reclassified from accumulated other comprehensive income to other expense, net upon sale of swap, net of tax	(5,099)	—
Amount reclassified from accumulated other comprehensive income to interest expense	(7,300)	(3,135)
Unrealized gain (loss) on interest rate swap, net of reclassifications and amortization	$ (15,114)	$ 19,321

The Company had no derivative assets or liabilities at December 31, 2023. The fair values and locations in the consolidated balance sheet at December 31, 2022 of the Company's derivative assets (liabilities) designated as a hedging instrument were as follows (in thousands):

	Balance sheet location	December 31, 2022
Interest rate derivative - asset derivative	Other current assets	$ 13,212
Interest rate derivative - asset derivative	Other assets	12,216
		$ 25,428

The Company classified its interest rate derivative aggregating $25.4 million at December 31, 2022, as Level 2 fair value measurements within the fair value hierarchy (see Note 6).

(16) PREFERRED STOCK AND WARRANTS

On March 28, 2023, the Company issued 55,000 shares of Preferred Stock to investors in the Private Placement at a price of $970 per share, along with 4,858,090 Warrants with an exercise price of $3.77 per share.

The Company accounts for the Preferred Stock and Warrants as liability-classified instruments based on an assessment of their specific terms in accordance with ASC Topic 480, *Distinguishing Liabilities from Equity*. The fair value option was elected for the Preferred Stock, as the Company considers fair value to best reflect its expected future economic value. These liabilities are remeasured to fair value at each reporting date using the same valuation methodology applied upon issuance using current input assumptions.

The value of the Preferred Stock is calculated using the Black-Derman-Toy (BDT) stochastic yield lattice model to capture the optimal timing of repayment, increasing dividend rate and other features and the value of the Warrants is calculated using the Black-Scholes Pricing Model.

Changes in the fair value of the Preferred Stock and Warrants are reported as Other expense, net in the Company's consolidated statements of operations.

The Company determined the fair value of the Preferred Stock and Warrants using Level 3 input. The key assumptions input into the models utilized were as follows as of December 31, 2023:

	Preferred Stock (BDT)
Face value per share	$1,000
Interest payments per year	4
Dividend rate - year 1 (paid in-kind)	9.25%
Dividend rate - year 2 (paid in-kind or in cash at the Company's choice)	9.75%
Dividend rate - thereafter (paid in cash)	12.00%
Yield volatility	25.0%
Time to maturity (in years)	1.8

	Warrants (Black-Scholes)
Stock price	$2.90
Strike price	$3.77
Risk-free rate	3.95%
Volatility	60.5%
Dividend yield	0.0%
Time to expiration (years)	3.2

The changes in the Company's Preferred Stock and Warrant liabilities for the year ended December 31, 2023 were as follows (in thousands):

	Preferred stock liability
Balance at January 1, 2023	$ —
Issued	47,854
Cumulative dividends	3,935
Fair value change	1,548
Balance at December 31,2023	$ 53,337

	Warrant liability
Balance at January 1, 2023	$ —
Issued	5,496
Fair value change	(201)
Balance at December 31,2023	$ 5,295

The Preferred Stock is subordinate to Company indebtedness and senior to the Company’s common stock or other equity. Holders of the Preferred Stock are entitled to cumulative dividends that accrue quarterly through the September 30, 2025 maturity date. Dividends are payable in-kind during the first year at a rate of 9.25%. At the Company’s option, the dividends are payable in-kind or in cash during the second year at a rate of 9.75%. Dividends thereafter are payable in cash at a rate of

12.00%. The proceeds from the Preferred Stock issuance were approximately $53.4 million, including $10.0 million from existing related party stockholders. Offering costs paid by the Company of approximately $3.5 million were recorded in Other expense, net in the year ended December 31, 2023. The net proceeds from the Private Placement were used for the repayment of debt. The Preferred Stock is redeemable on or after the first and second anniversaries of the closing date at a rate of 103% and 102%, respectively.

The Warrants are immediately exercisable and upon an event such as a merger, consolidation, asset sale or similar change of control, the Warrants may be exercised and the holders may vote the underlying shares of common stock. In connection with the Private Placement, the Company provided the investors with certain registration rights relating to the Preferred Stock, the Warrants and the shares of the Company's common stock underlying the Warrants, that required the Company to file a registration statement on Form S-3 with the SEC within 30 days following the closing date of the Private Placement. The registration requirement was completed on May 19, 2023.

(17) REVENUE RECOGNITION

The Company's typical performance obligations include the following:

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

Significant Judgments

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

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

Deferred Revenue

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

Disaggregation of Revenue

The Company disaggregates its revenue from contracts with customers based on the nature of the products and services and the geographic regions in which each customer is domiciled. The Company's total revenue for the years ended December 31, 2023, 2022 and 2021 was disaggregated geographically as follows:

Year ended December 31, 2023	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 161,945	$ 133,737	$ 48,733	$ 344,415
Europe, Middle East and Africa	151,938	75,478	34,485	261,901
Asia Pacific	115,923	39,891	11,269	167,083
Other	15,344	30,546	7,050	52,940
	$ 445,150	$ 279,652	$ 101,537	$ 826,339

Year ended December 31, 2022	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 175,189	$ 132,655	$ 44,819	$ 352,663
Europe, Middle East and Africa	147,523	75,948	29,310	252,781
Asia Pacific	95,828	41,677	13,594	151,099
Other	24,140	31,815	7,262	63,217
	$ 442,680	$ 282,095	$ 94,985	$ 819,760

Year ended December 31, 2021	Product revenue	Service revenue (maintenance)	Service revenue (professional services)	Total revenue
United States	$ 196,058	$ 132,683	$ 47,296	$ 376,037
Europe, Middle East and Africa	138,203	79,475	30,349	248,027
Asia Pacific	92,803	41,945	18,183	152,931
Other	25,978	32,218	9,766	67,962
	$ 453,042	$ 286,321	$ 105,594	$ 844,957

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, 2023, 2022 and 2021 was as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Indirect sales through channel program	$ 157,495	$ 131,998	$ 117,065
Direct sales	287,655	310,682	335,977
	$ 445,150	$ 442,680	$ 453,042

The Company's product revenue from sales to enterprise customers and from sales to service provider customers for the years ended December 31, 2023, 2022 and 2021 was as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Sales to enterprise customers	$ 143,853	$ 125,664	$ 111,494
Sales to service provider customers	301,297	317,016	341,548
	$ 445,150	$ 442,680	$ 453,042

The Company's product revenue and service revenue components by segment for the years ended December 31, 2023, 2022 and 2021 was as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Product revenue			
Cloud and Edge	184,730	215,770	248,570
IP Optical Networks	260,420	226,910	204,472
Total product revenue	445,150	442,680	453,042
Service revenue			
Maintenance			
Cloud and Edge	219,939	222,238	228,321
IP Optical Networks	59,713	59,857	58,000
Total maintenance revenue	279,652	282,095	286,321
Professional services			
Cloud and Edge	72,979	70,130	79,765
IP Optical Networks	28,558	24,855	25,829
Total professional services revenue	101,537	94,985	105,594
Total service revenue	381,189	377,080	391,915

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, 2023 and 2022 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, 2023 and 2022 were as follows (in thousands):

	Accounts receivable	Unbilled accounts receivable	Deferred revenue (current)	Deferred revenue (long-term)
Balance at January 1, 2023	$ 170,969	$ 96,275	$ 113,939	$ 19,254
Increase (decrease), net	15,969	(14,792)	(558)	(36)
Balance at December 31, 2023	$ 186,938	$ 81,483	$ 113,381	$ 19,218

	Accounts receivable	Unbilled accounts receivable	Deferred revenue (current)	Deferred revenu (long-term)
Balance at January 1, 2022	$ 208,972	$ 73,945	$ 109,119	$ 20,61
Increase (decrease), net	(38,003)	22,330	4,820	(1,36
Balance at December 31, 2022	$ 170,969	$ 96,275	$ 113,939	$ 19,25

The Company recognized approximately $108 million of revenue in the year ended December 31, 2023 that was recorded as deferred revenue at December 31, 2022 and approximately $103 million of revenue in the year ended December 31, 2022 that was recorded as deferred revenue at December 31, 2021. Of the Company's deferred revenue reported as long-term in its consolidated balance sheet at December 31, 2023, the Company expects that approximately $13 million will be recognized as revenue in 2025, approximately $4 million will be recognized as revenue in 2026 and approximately $2 million will be recognized as revenue in 2027 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. The payments related to these costs have been deferred on our consolidated balance sheet and are being amortized over the expected life of the customer contract, which is generally five years. At December 31, 2023 and 2022, the Company had $3.0 million and $3.6 million, respectively, of deferred sales commissions capitalized.

(18) OPERATING SEGMENT INFORMATION

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

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

The IP Optical Networks segment provides high-performance, secure solutions for IP networking and optical transport, supporting wireless networks including 5G, metro and edge aggregation, core networking, data center interconnect, legacy network transformation and transport solutions for wholesale carriers. This portfolio is offered to service provider, enterprise and industry verticals with critical transport network infrastructures including utilities, government, defense, transportation, and education and research.

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

The CODM utilizes revenue and adjusted gross profit to measure and assess each segment's performance. The Company calculates adjusted gross profit by excluding from cost of revenue: amortization of acquired technology, stock-based compensation, acquisition-related inventory adjustments and acquisition-related facilities adjustments, and may also exclude other items in future periods that the Company believes are not part of the Company's core business. Adjusted gross profit is not a financial measure determined in accordance with U.S. GAAP, may not be comparable to similarly titled measures used by other companies, and should not be considered a substitute for gross profit or other results reported in accordance with U.S. GAAP. See below for a reconciliation of adjusted gross profit to gross profit which is the most directly comparable U.S. GAAP measure.

The tables below provide revenue, adjusted gross profit and depreciation expense by reportable segment for the years ended December 31, 2023, 2022 and 2021 (in thousands):

Revenue	Year ended December 31, 2023	2022	2021
Segment revenue:			
Cloud and Edge	$ 477,647	$ 508,137	$ 556,656
IP Optical Networks	348,692	311,623	288,301
Total revenue	$ 826,339	$ 819,760	$ 844,957

Adjusted gross profit	Year ended December 31, 2023	2022	2021
Segment adjusted gross profit:			
Cloud and Edge	$ 314,594	$ 330,395	$ 370,504
IP Optical Networks	124,436	104,711	114,496
Total segment adjusted gross profit	439,030	435,106	485,000
Stock-based compensation expense	(2,657)	(2,628)	(1,997)
Amortization of acquired technology	(28,290)	(31,542)	(38,343)
Gross profit	$ 408,083	$ 400,936	$ 444,660

Depreciation expense	Year ended December 31, 2023	2022	2021
Segment depreciation expense:			
Cloud and Edge	$ 9,798	$ 10,758	$ 12,269
IP Optical Networks	4,307	4,537	4,693
Total depreciation expense	$ 14,105	$ 15,295	$ 16,962

(19) MAJOR CUSTOMERS

The following customers contributed 10% or more of the Company's revenue in at least one of the years ended December 31, 2023, 2022 and 2021:

	Year ended December 31, 2023	2022	2021
Verizon Communications Inc.	11%	15%	16%

At December 31, 2023 and 2022, no customer accounted for 10% or more of the Company's accounts receivable balance. 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 historically been within management's expectations.

(20) STOCK-BASED COMPENSATION PLANS

The Company grants stock-based compensation to employees, officers and non-employee directors, as well as consultants and advisors of the Company and its subsidiaries under its Amended and Restated 2019 Incentive Award Plan which provides for the award of stock options, stock appreciation rights, restricted stock awards ("RSAs"), performance-based stock awards, restricted stock units ("RSUs"), performance-based stock units ("PSUs") and other stock- or cash-based awards.

Executive Equity Arrangements

Inducement Awards

In connection with his appointment as President and Chief Executive Officer of Ribbon on March 16, 2020, the Company awarded Bruce McClelland sign-on equity grants, comprised of RSUs and a PSU grant with both market and service conditions. The Company estimates as of December 31, 2023 that the market conditions surrounding the PSUs granted will not be met by the expiration date of September 1, 2024.

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 and certain other employees. Vesting periods for RSAs, RSUs, and PSUs granted range from one to three years. PSUs granted consist of 60% that have both performance and service conditions (the "Performance PSUs") and 40% that have both market and service conditions (the "Market PSUs"). Each Performance PSU is comprised of three consecutive fiscal year performance periods beginning in the year of grant, with one-third of the Performance PSUs attributable to each fiscal year performance period. The Market PSUs have one three-year performance period, beginning January 1 in the year of grant and ending on December 31, three years thereafter. The number of shares of common stock underlying the PSUs that can be earned will not exceed 200% of the Performance or Market PSUs. Shares subject to PSUs that fail to be earned will be forfeited.

Restricted Stock Units

The activity related to the Company's RSUs for the year ended December 31, 2023 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2023	7,649,747	$ 3.96
Granted	4,991,829	$ 2.88
Vested	(4,840,738)	$ 3.99
Forfeited	(709,470)	$ 3.97
Unvested balance at December 31, 2023	7,091,368	$ 3.18

The total grant date fair value of restricted stock underlying RSUs that vested was $19.3 million in the year ended December 31, 2023, $18.1 million in the year ended December 31, 2022 and $12.5 million in the year ended December 31, 2021.

Performance-Based Stock Units

The activity related to the Company's PSUs for the year ended December 31, 2023 was as follows:

	Shares	Weighted Average Grant Date Fair Value
Unvested balance at January 1, 2023	6,653,503	$ 2.52
Granted	1,800,202	$ 3.26
Vested	(381,071)	$ 6.91
Forfeited	(1,774,703)	$ 4.05
Unvested balance at December 31, 2023	6,297,931	$ 2.07

The total grant date fair value of restricted stock underlying PSUs that vested was $2.6 million in the year ended December 31, 2023, $0.9 million in the year ended December 31, 2022 and $1.7 million in the year ended December 31, 2021.

Stock-Based Compensation

The consolidated statements of operations included stock-based compensation for the years ended December 31, 2023, 2022 and 2021 as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Product cost of revenue	$ 510	$ 471	$ 313
Service cost of revenue	2,147	2,157	1,684
Research and development	4,933	5,108	4,253
Sales and marketing	7,111	6,074	7,218
General and administrative	7,105	4,897	5,950
	$ 21,806	$ 18,707	$ 19,418

At December 31, 2023, there was $17.9 million, net of expected forfeitures, of unrecognized stock-based compensation expense related to unvested RSUs and PSUs. This expense is expected to be recognized over a weighted average period of approximately 1.4 years. The Company issues authorized and unissued shares under its equity plans and at December 31, 2023, there were 3,959,285 total shares of common stock reserved for that purpose with 105,495 of those shares authorized only for issuance of shares upon exercise of stock options.

(21) LEASES

The Company has operating leases for corporate offices and research and development facilities, and has historically had finance leases for certain equipment. Operating leases are reported separately in the Company's consolidated balance sheets. Assets acquired under finance leases, if any, are included in Property and equipment, net, in the consolidated balance sheets.

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, 2023 and 2022 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.

Certain leased facilities are being partially or fully vacated as part of the 2022 Restructuring Plan and for some of those facilities, the Company has no plans to enter into sublease agreements. Accordingly, the Company accelerated the amortization of those lease assets through the planned cease-use date of each facility, resulting in additional amortization expense of

$1.0 million and $1.6 million in the years ended December 31, 2023 and 2022, respectively. No variable lease costs were accrued in the year ended December 31, 2023 for future estimated variable expenses related to assets partially or fully vacated with no intent or ability to sublease. Variable lease costs for the year ended December 31, 2022 included accruals of $1.0 million for all estimated future variable lease costs related to those facilities.

The Company did not record any accelerated amortization or estimated future variable lease costs in the year ended December 31, 2023 or 2022 related to the 2020 Restructuring Plan. The Company accelerated amortization totaling $0.8 million in the year ended December 31, 2021 for certain leased facilities that were vacated in 2021 as part of the consolidation of certain sites following the ECI Acquisition. The Company did not record estimated future variable lease costs in the year ended December 31, 2021 related to the 2020 Restructuring Plan.

In connection with the 2019 Restructuring Initiative, certain leased facilities were partially or fully vacated as the Company consolidated its facilities, with no plans to enter into sublease agreements for certain of those facilities. The Company did not accelerate amortization or record liabilities for future estimated variable lease costs in the years ended December 31, 2023 or 2022. In the year ended December 31, 2021, the Company accelerated amortization of $3.4 million for certain leased facilities that were vacated in those years and recorded liabilities aggregating $1.4 million for all future estimated variable lease costs related to those facilities.

All incremental accelerated amortization and accrual for all estimated future variable lease costs are included in Restructuring and related expense in the Company's consolidated statements of operations for the years ended December 31, 2023, 2022 and 2021. At December 31, 2023 and 2022, the Company had accruals of $1.5 million and $2.0 million, respectively, for all future anticipated variable lease costs related to these facilities. The Company may incur additional future expense if it is unable to sublease other locations included in the Facilities Initiative. In addition, in the year ended December 31, 2021, this accelerated amortization and provision for future estimated variable lease costs was partially offset by the recognition of $2.1 million of income in conjunction with lease amendments that modified the Company's obligation and rentable square footage at a site in North Carolina.

The Company leases its corporate offices and other facilities under operating leases, which expire at various times through 2033.

The Company's right-of-use lease assets and lease liabilities at December 31, 2023 and 2022 were as follows (in thousands):

		December 31,	
	Classification	**2023**	**2022**
Assets:			
Operating lease assets	Operating lease right-of-use assets	$ 39,783	$ 44,888
Liabilities:			
Current Operating	Operating lease liabilities	$ 15,739	$ 15,416
Non-Current Operating	Operating lease liabilities, net of current	38,711	46,183
Total lease liabilities		$ 54,450	$ 61,599

The components of lease expense for the years ended December 31, 2023, 2022 and 2021 were as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Operating lease cost*	$ 18,767	$ 21,121	$ 21,828
Finance lease cost:			
Amortization of leased assets	—	287	695
Interest on lease liabilities	—	13	67
Short-term lease cost	13,978	14,209	13,250
Variable lease costs (costs excluded from minimum fixed lease payments)**	3,364	4,007	4,030
Sublease income	(1,376)	(1,647)	(1,496)
Net lease cost	$ 34,733	$ 37,990	$ 38,374

* Operating lease costs for the years ended December 31, 2023, 2022 and 2021 include $1.0 million, $1.6 million, and $3.4 million, respectively, of accelerated amortization for certain assets partially or fully vacated with no intent or ability to sublease. Operating lease cost for the year ended December 31, 2021 also includes $2.1 million of income related to a lease modification for one of these assets.

** Variable lease costs for the years ended December 31, 2022 and 2021 included accruals of $1.0 million and $1.4 million, respectively, for all future estimated variable expenses related to certain assets partially or fully vacated with no intent or ability to sublease. No such variable costs were accrued in the year ended December 31, 2023.

Cash flow information related to the Company's leases for the years ended December 31, 2023, 2022 and 2021 was as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Cash paid for amounts included in the measurement of lease liabilities:			
Operating cash flows from operating leases	$ 19,021	$ 20,363	22,365
Operating cash flows from finance leases	$ —	$ 13	67
Financing cash flows from finance leases	$ —	$ 595	903

Other information related to the Company's leases as of December 31, 2023 and 2022 was as follows (in thousands):

	December 31,	
	2023	2022
Weighted average remaining lease term (years):		
Operating leases	5.50	5.90
Weighted average discount rate:		
Operating leases	6.34 %	5.79 %

Future minimum fixed lease payments under noncancelable leases at December 31, 2023 were as follows (in thousands):

	Operating leases
2024	$ 18,542
2025	10,506
2026	8,676
2027	7,569
2028	6,305
2029 and beyond	13,181
Total lease payments	64,779
Less: interest	(10,329)
Present value of lease liabilities	$ 54,450

(22) EMPLOYEE DEFINED CONTRIBUTION PLANS

The Company offers 401(k) savings plans to eligible employees. The Company matches 50% of each employee's contributions to the 401(k) program up to 4% of the employee's eligible earnings, for a maximum match of 2% of eligible earnings.

The Company recorded expense related to its employee defined contribution plans aggregating $3.0 million, $3.3 million and $3.5 million in the years ended December 31, 2023, 2022 and 2021, respectively.

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

The Company has defined benefit retirement plans that cover certain employees at various international locations. The Company's policy is to contribute amounts at least sufficient to satisfy the minimum amount required by applicable law and regulations or to directly pay benefits where appropriate. Benefits under the defined benefit plans are typically based either on years of service and the employee's compensation (generally during a fixed number of years immediately before retirement) or on annual credits. The range of assumptions that are used for these non-U.S. defined benefit plans reflect the different economic environments within the various countries.

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, 2023 and 2022, the funded status of the plans, and the amounts recognized in the consolidated balance sheets as of December 31, 2023 and 2022 were as follows (in thousands):

	Year ended December 31, 2023	Year ended December 31, 2022
Changes in projected benefit obligations:		
Projected benefit obligation, beginning of year	$ 21,257	$ 26,938
Service cost	1,193	1,355
Interest cost	938	563
Participant contributions	—	—
Plan amendments	—	—
Net actuarial (gain) loss on obligation	(402)	(5,604)
Settlement	(1,773)	(1,063)
Benefits and expenses paid	(444)	(932)
Projected benefit obligation, end of year	$ 20,769	$ 21,257
Changes in plan assets:		
Fair value of plan assets, beginning of year	$ 14,629	$ 15,303
Actual return on plan assets	183	(672)
Employer contributions	975	1,954
Participant contributions	39	39
Benefits paid	(2,217)	(1,995)
Fair value of plan assets, end of year	$ 13,609	$ 14,629
Funded status at end of year	$ (7,160)	$ (6,628)
Amounts recognized in accumulated other comprehensive income consist of:		
Prior service (credit) cost	$ (3,161)	$ (3,481)
Net actuarial (gain) loss	(1,100)	(1,704)
	$ (4,261)	$ (5,185)
Amounts recognized in the consolidated balance sheets consist of:		
Other assets (non-current pension asset)	$ 1,013	$ 552
Accrued expenses and other (current pension liability)	(764)	(803)
Other long-term liabilities (non-current pension liability)	(7,409)	(6,377)
Net amount recognized	$ (7,160)	$ (6,628)

The increase in the underfunded status of the Company's defined benefit plans at December 31, 2023 compared to December 31, 2022 was primarily the result of significant lump sum payments in Israel of $1.8 million.

Plans with underfunded or non-funded accumulated benefit obligations at December 31, 2023 and 2022 were as follows (in thousands):

	December 31, 2023	December 31, 2022
Aggregate projected benefit obligation	$ 10,811	$ 9,450
Aggregate accumulated benefit obligation	$ 8,547	$ 7,418
Aggregate fair value of plan assets	$ 2,638	$ 2,270

Plans with overfunded accumulated benefit obligations at December 31, 2023 and 2022 were as follows (in thousands):

	December 31, 2023	December 31, 2022
Aggregate projected benefit obligation	$ 9,958	$ 11,807
Aggregate accumulated benefit obligation	$ 7,958	$ 9,547
Aggregate fair value of plan assets	$ 10,971	$ 12,359

Net periodic benefit costs for the years ended December 31, 2023, 2022 and 2021 were as follows (in thousands):

	Year ended December 31, 2023	Year ended December 31, 2022	Year ended December 31, 2021
Service cost	$ 1,193	$ 1,355	$ 1,321
Interest cost	938	563	523
Expected return on plan assets	(607)	(266)	(314)
Plan asset expenses	—	—	—
Settlement charge (credit)	(417)	808	—
Amortization of prior service cost	(320)	(320)	—
Amortization of net (gain) loss	(165)	275	81
Net periodic benefit costs	$ 622	$ 2,415	$ 1,611

Expected benefit payments for the next ten years are as follows (in thousands):

Years ending December 31,	
2024	$ 1,436
2025	1,086
2026	1,423
2027	2,120
2028	2,435
2029 to 2033	10,733
	$ 19,233

The changes in plan assets and benefit obligations recognized in other comprehensive income (loss) before tax for the years ended December 31, 2023, 2022 and 2021 were as follows (in thousands):

	Year ended December 31, 2023	Year ended December 31, 2022	Year ended December 31, 2021
Net loss (gain)	$ 22	$ (4,666)	$ 4,201
Prior service (credit) cost	—	—	(3,801)
Amortization of net gain (loss)	165	(275)	(81)
Amortization of prior service credit (cost)	320	320	—
Settlement credit (charge)	417	(808)	—
Total recognized in other comprehensive income (loss)	$ 924	$ (5,429)	$ 319

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.

The principal weighted average assumptions used to determine the benefit obligation at December 31, 2023 and 2022 were as follows:

	December 31, 2023	December 31, 2022
Discount rate	4.65 %	4.74 %
Rate of compensation increase	3.95 %	4.02 %

The principal weighted average assumptions used to determine net period benefit cost for the years ended December 31, 2023, 2022 and 2021 were as follows:

	Year ended December 31,		
	2023	2022	2021
Discount rate	4.74 %	2.24 %	2.16 %
Expected long-term return on plan assets	4.34 %	1.79 %	2.06 %
Rate of compensation increase	4.02 %	3.90 %	2.41 %

Assumed discount rates are used in the measurement of the projected and accumulated benefit obligations, as well as the service and interest cost components of net periodic pension cost. Estimated discount rates reflect the rates at which the pension benefits could be effectively settled. For each defined benefit plan, the Company chooses an estimated discount rate from a readily available market index rate, based upon high-quality fixed income investments, specific to the country or economic zone in which the benefits are paid and taking into account the duration of the plan and the number of participants.

The Company's plans in both the Netherlands and Switzerland are funded through insurance contracts, which have historically provided guaranteed interest credit. The fair value of these contracts is derived from the insurance companies' assessment of the minimum value of the benefits provided by the insurance contracts. The methodology used to value these plan assets has historically assumed that the value of the plan assets equals the guaranteed insured benefits. For consistency, the same discount rate used in the valuation of the benefit obligations is used to place a value on the plan assets. The assets are assumed to grow each year in line with the discount rate, and therefore, the expected return on the assets is set equal to the discount rate. The fair value of the plan assets in Switzerland was $2.6 million at December 31, 2023 and $2.3 million at December 31, 2022. Due to the plan amendment in 2020 that changed the benefit structure of the Netherlands plan, the Company no longer has any obligation related to this plan beyond the payment of insurance premiums. Therefore, there is no projected benefit obligation and no plan assets in the Netherlands. The Company classifies the fair value of its plan assets as Level 2 in the fair value hierarchy as discussed in Note 6.

During the years ended December 31, 2023 and 2022, employees in Switzerland made contributions aggregating $39,000 each year. Employee contributions to this plan are based on a fixed 5% of the relevant pensionable earnings. The Company funds this plan by contributing at least the minimum amount required by applicable regulations and as recommended by an independent actuary.

During the years ended December 31, 2023, 2022 and 2021, the Company contributed $1.0 million, $2.0 million and $1.0 million, respectively, to all of its pension plans. The Company expects to contribute $1.5 million to all of its defined benefit plans in 2024.

(24) INCOME TAXES

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

	Year ended December 31,		
	2023	2022	2021
Loss before income taxes:			
United States	$ (5,363)	$ (84,784)	$ (29,985)
Foreign	(50,010)	(27,815)	(178,158)
	$ (55,373)	$ (112,599)	$ (208,143)

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

	Year ended December 31,		
	2023	2022	2021
Provision (benefit) for income taxes:			
Current:			
Federal	$ 9,927	$ (3,582)	$ 5,033
State	2,790	2,573	1,836
Foreign	7,312	4,744	7,661
Total current	20,029	3,735	14,530
Deferred:			
Federal	(10,417)	(10,333)	(38,027)
State	(1,059)	(4,045)	97
Foreign	2,280	(3,873)	(7,558)
Total deferred	(9,196)	(18,251)	(45,488)
Total	$ 10,833	$ (14,516)	$ (30,958)

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

	Year ended December 31,		
	2023	2022	2021
U.S. statutory income tax rate	21.0 %	21.0 %	21.0 %
State income taxes, net of federal benefit	(2.1)	1.8	(0.7)
Foreign income taxes	(9.9)	(1.4)	0.5
Stock-based compensation	(5.4)	(2.4)	(0.1)
Tax credits	7.7	2.2	1.6
Uncertain tax positions	2.0	1.3	0.5
Valuation allowance	(27.0)	(3.8)	2.5
Non-deductible goodwill impairment	—	—	(11.7)
Other permanent adjustments	(1.3)	(2.6)	0.9
Permanent foreign exchange adjustments	(2.3)	(1.4)	0.5
Other, net	(2.3)	(1.8)	(0.1)
Effective income tax rate	(19.6)%	12.9 %	14.9 %

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

	December 31,	
	2023	2022
Assets:		
Net operating loss carryforwards	$ 398,050	$ 413,773
Capital loss carryforwards	100,061	99,505
Tax credit carryforwards	29,541	28,902
Capitalized research and development expenses	58,959	40,668
Deferred revenue	2,042	3,510
Accrued expenses	10,901	9,068
Inventory	4,108	2,820
Stock-based compensation	1,506	1,709
Fixed assets	159	2,506
Lease liabilities	12,009	12,829
Other temporary differences	440	1,324
	617,776	616,614
Valuation allowance	(488,799)	(488,550)
Total deferred tax assets	128,977	128,064
Liabilities:		
Intangible assets	(45,448)	(55,037)
Operating lease right-of-use assets	(8,817)	(8,519)
Interest rate swap	—	(6,168)
Unremitted foreign income	(10,567)	(8,441)
Total deferred tax liabilities	(64,832)	(78,165)
Total net deferred tax assets	$ 64,145	$ 49,899

The deferred tax assets and liabilities based on tax jurisdictions are presented in the Company's consolidated balance sheets as follows:

	December 31,	
	2023	2022
Deferred income taxes - net noncurrent assets	$ 69,761	$ 53,649
Deferred income taxes - net noncurrent liabilities	(5,616)	(3,750)
	$ 64,145	$ 49,899

At December 31, 2023, the Company had U.S. federal net operating losses ("NOLs") of $124.9 million. The Company also had U.S. state NOLs of $38.4 million. In addition, the Company had $1.6 billion of Israel NOLs. The U.S. federal NOL carryforwards expire between 2024 and 2037. The U.S. state NOLs begin to expire in 2024, and the Company also has indefinite-lived state NOLs. The Israel NOLs do not expire.

The Company also has available federal, state and foreign income tax credit carryforwards of $29.5 million. The federal foreign tax credit carryforwards expire between 2030 and 2032. The state tax credits, which are primarily research and development credits, begin to expire in 2024, while others can be carried forward until exhausted. The foreign income tax credits expire in various periods.

The Company has provided for income taxes on the undistributed earnings of its non-U.S. subsidiaries as of December 31, 2023, excluding Ireland and Israel. These subsidiaries, excluding Ireland and Israel, are cost-plus or limited risk distributors that are not anticipated to need to use excess funds locally. Accordingly, the Company is required to recognize and record deferred taxes in 2023. The deferred taxes, which are primarily future withholding taxes, are recorded on the entire outside basis differences related to the foreign subsidiaries, the largest of these differences being undistributed earnings. Undistributed profits of Ireland and Israel, as well as other outside basis differences in foreign subsidiaries, were indefinitely reinvested in foreign operations. Quantification of the deferred tax liability, if any, associated with indefinitely reinvested earnings and outside basis differences was not practicable.

Under the provisions of the Internal Revenue Code, the net operating losses and tax credit carryforwards are subject to review and possible adjustment by the Internal Revenue Service. Net operating losses and tax credit carryforwards may become subject to an annual limitation in the event of certain cumulative changes in the ownership of significant shareholders over a three-year period in excess of 50%, as defined under sections 382 and 383 of the Internal Revenue Code, as well as similar state provisions. As a result of the Sonus and GENBAND merger in 2017, the Company has $102.6 million of U.S. federal net operating loss carryforwards remaining as of December 31, 2023 with an annual section 382 limitation of $9.7 million. The Company believes these NOLs are fully realizable. As a result of the ECI Acquisition in 2020, the Company has $23.5 million of U.S. federal NOLs remaining as of December 31, 2023 with an annual section 382 limitation of $1.1 million. The Company does not believe all of these NOLs are realizable and, therefore, have recorded a partial valuation allowance against these NOLs.

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. Accordingly, the Company has recorded a valuation allowance against its U.S. deferred tax assets of $23.4 million at December 31, 2023 and $25.5 million at December 31, 2022. The Company also maintains a valuation allowance against certain of its foreign deferred tax assets, predominantly Israel, amounting to approximately $465 million at December 31, 2023 and $463 million at December 31, 2022. The deferred tax assets recognized with no valuation allowance at December 31, 2023 and 2022 primarily relate to other foreign subsidiaries where recoverability is concluded to be more likely than not based on the Company's cost-plus compensation policy, as well as NOLs and tax credits in the U.S. that are expected to be utilized prior to expiration.

A reconciliation of the Company's unrecognized tax benefits is as follows (in thousands):

	Year ended December 31,		
	2023	2022	2021
Unrecognized tax benefits at January 1	$ 12,001	$ 17,813	$ 14,054
Increases related to current year tax positions	—	156	4,017
Increases related to prior period tax positions	52	40	3,168
Decreases related to the lapse of the applicable statute of limitations	(821)	(560)	(3,087)
Decreases related to prior period tax positions	$ (300)	$ (5,448)	$ (339)
Unrecognized tax benefits at December 31	$ 10,932	$ 12,001	$ 17,813

The Company accounts for interest and penalties related to uncertain tax positions as part of its provision for income taxes. The Company had $14.0 million, $14.9 million and $21.0 million of unrecognized tax benefits, including penalties and interest, at December 31, 2023, 2022 and 2021, respectively. Of these amounts, $10.5 million, $11.2 million and $12.7 million represent the amount of unrecognized tax benefits that, if recognized, would impact the effective income tax rate for the years ended December 31, 2023, 2022 and 2021, respectively. The Company recorded income tax expense (benefit) for potential penalties and interest of $0.2 million, $(0.3) million and $1.9 million for the years ended December 31, 2023, 2022 and 2021, respectively. The Company had $3.2 million and $2.9 million accrued in Other long-term liabilities for penalties and interest at December 31, 2023 and 2022, respectively. The Company believes that it is reasonably possible that $0.3 million in tax positions related to its unrecognized tax benefits will be recognized within the next twelve months.

The Company and its subsidiaries file income tax returns in the U.S. federal jurisdiction as well as various state and foreign jurisdictions. Generally, the tax years 2019 through 2022 remain open to examination by the major taxing jurisdictions in which the Company operates. The Company's federal and state NOLs generated prior to 2019 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, 2023, 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.

(25) RELATED PARTIES

The Company recognized revenue from its largest stockholder of $12.8 million, $6.6 million and $4.5 million in the years ended December 31, 2023, 2022 and 2021, respectively. Additionally, as discussed in Note 16, certain related party stockholders participated in the Private Placement.

(26) COMMITMENTS AND CONTINGENCIES

Contingencies

Liabilities for Royalty Payments to the IIA

Prior to the ECI Acquisition, ECI had received research and development grants from the IIA. The Company assumed ECI's contract with the IIA, which requires the Company to pay royalties to the IIA on proceeds from the sale of products which the Israeli government has supported by way of research and development grants. The royalties for grants prior to 2017 were calculated at the rates of 1.3% to 5.0% of the aggregated proceeds from the sale of such products developed at certain of the Company's R&D centers, up to an amount not exceeding 100% of such grants plus interest at LIBOR. Effective for grants approved in 2017 and thereafter, interest was calculated at the higher of LIBOR plus 1.5% to 2.75%. At December 31, 2023, the Company's maximum possible future royalties commitment, including $1.3 million of unpaid royalties accrued, was $20.4 million, including interest of $0.9 million, based on estimates of future product sales, grants received from the IIA and not yet repaid, and management's estimation of products still to be sold.

Litigation

The Company is often a party to disputes and legal proceedings that it considers routine and incidental to its business, including those described below. The Company believes that it has meritorious defenses to the allegations made in the pending cases and intends to vigorously defend these lawsuits; however, the Company is unable currently to forecast the ultimate outcome of these or similar matters. Since it is difficult to predict the outcome of legal proceedings, it is possible that the ultimate outcomes could materially and adversely affect the Company’s business, financial position, results of operations or cash flows. Accordingly, with respect to these proceedings, the Company is currently unable to reasonably estimate the possible loss or range of possible loss.

Miller Complaint. 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. There was an oral argument on the motion to dismiss on February 12, 2020, and on October 20, 2022 the court denied the motion to dismiss. In June 2023, the Defendants agreed to a settlement in principle with the named plaintiffs, and the settlement was preliminarily approved by the court on October 18, 2023. The proposed settlement remains subject to final approval by the affected stockholders and the court. The court has set April 24, 2024 as the hearing date for final approval of the proposed settlement. If approved, the proposed settlement would provide a release of all claims asserted in the litigation to all Defendants, who continue to deny liability. The proposed $4.5 million settlement amount was deposited into escrow in the fourth quarter of 2023 by the provider of the Company's Directors and Officers liability insurance policy.

Charter Complaint. On September 19, 2022, Charter Communications Operating, LLC (“Charter”) filed two complaints against two of our subsidiaries (Sonus Networks, Inc. and Ribbon Communications Operating Company, Inc.) alleging breach of contract with respect to indemnification obligations purportedly owed to Charter in connection with Charter’s legal dispute with Sprint Communications Company L.P., which was settled by Charter in March 2022. One complaint was filed in the

Supreme Court of the State of New York, in New York County; the second complaint was filed by Charter as well as co-plaintiffs Charter Communications Holding Company, LLC and Bright House Networks, LLC, in the Superior Court of the State of Delaware in and for New Castle County. In both complaints, Charter is seeking monetary damages. The Company filed its answer to the first complaint file in New York on December 7, 2022 and to the second complaint filed in Delaware on January 9, 2023. Discovery is on-going and the court in the Delaware complaint has set a preliminary trial date of January 2025.

WideOpenWest Complaint. On August 9, 2023, WideOpenWest, Inc. and WideOpenWest Finance, LLC (collectively, "WOW") filed a complaint against Ribbon alleging breach of contract with respect to indemnification obligations purportedly owed to WOW in connection with WOW's legal dispute with Sprint Communications Company L.P., which was settled by WOW in the second quarter of 2023. The complaint was filed in the 429th Judicial District of the District Court of the State of Texas, in Collin County, Texas and has since been transferred to the 493rd Judicial District Court in Collin County. In the complaint, WOW is seeking monetary damages. The Company filed its answer to the complaint on October 5, 2023. Discovery is on-going and the court has set a preliminary trial date of December 2024.

(27) QUARTERLY RESULTS (UNAUDITED)

The following tables present the Company's quarterly operating results for the years ended December 31, 2023 and 2022. 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	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Year ended December 31, 2023				
Revenue	$ 186,159	$ 210,618	$ 203,161	$ 226,401
Cost of revenue	104,757	109,148	99,658	104,693
Gross profit	$ 81,402	$ 101,470	$ 103,503	$ 121,708
(Loss) income from operations	$ (35,189)	$ (6,622)	$ 856	$ 16,670
Net (loss) income	$ (38,305)	$ (21,479)	$ (13,501)	$ 7,079
(Loss) earnings per share (1):				
Basic	$ (0.23)	$ (0.13)	$ (0.08)	$ 0.04
Diluted	$ (0.23)	$ (0.13)	$ (0.08)	$ 0.04
Shares used in computing (loss) earnings per share:				
Basic	168,541	170,103	171,190	171,755
Diluted	168,541	170,103	171,190	172,990

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
	(In thousands, except per share data)			
Year ended December 31, 2022				
Revenue	$ 173,198	$ 205,796	$ 207,127	$ 233,639
Cost of revenue	95,143	101,246	102,809	119,626
Gross profit	$ 78,055	$ 104,550	$ 104,318	$ 114,013
(Loss) income from operations	$ (39,054)	$ (7,239)	$ (3,296)	$ 1,265
Net (loss) income	$ (69,975)	$ (30,180)	$ (18,416)	$ 20,488
(Loss) earnings per share (1):				
Basic	$ (0.47)	$ (0.20)	$ (0.12)	$ 0.12
Diluted	$ (0.47)	$ (0.20)	$ (0.12)	$ 0.12
Shares used in computing (loss) earnings per share:				
Basic	149,167	150,190	158,921	168,163
Diluted	149,167	150,190	158,921	172,213

(1) (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

Evaluation of 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. In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives. We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods required by the Securities and Exchange Commission and that such information is accumulated and communicated to our management, including our principal executive officers and principal financial officer as appropriate, to allow timely decisions regarding required disclosure. 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, 2023.

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, 2023. 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, 2023, 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 have been no changes in our internal control over financial reporting during the fiscal quarter ended December 31, 2023 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, 2023, 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, 2023, 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, 2023, of the Company and our report dated February 28, 2024, expressed an unqualified opinion on those financial statements.

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, 2024

Item 9B. Other Information

During the three months ended December 31, 2023, none of the Company's directors or officers (as defined in Rule 16a-1(f) of the Securities Exchange Act of 1934) adopted, terminated or modified a Rule 10b5-1 trading arrangement or non-Rule 10b5-1 trading arrangement (as such terms are defined in Item 408 of Regulation S-K of the Securities Act of 1933). During the three months ended December 31, 2023, the Company did not adopt, terminate or modify a Rule 10b5-1 trading arrangement.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

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 2024 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, 2023 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 2024 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, 2023 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 2024 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, 2023 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 2024 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, 2023 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 2024 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, 2023 and is incorporated herein by reference.

PART IV

Item 15. Exhibit and 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 November 14, 2019, by and among the Registrant, Ribbon Communications Israel Ltd., Eclipse Communications Ltd., ECI Telecom Group Ltd. and ECI Holding (Hungary) Korlátolt Felelősségű Társaság (incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K, filed November 14, 2019 with the SEC).
2.2 **	Amended and Restated Purchase Agreement, dated December 1, 2020, among Ribbon Communications Inc., Ribbon Communications Operating Company, Inc., Ribbon Communications International Limited and American Virtual Cloud Technologies, Inc. (incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K, filed December 7, 2020 with the SEC).
3.1	Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K12B, filed October 30, 2017 with the SEC).
3.2	Certificate of Amendment of the Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K, filed November 28, 2017 with the SEC).
3.3	Second Certificate of Amendment to 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 August 4, 2023 with the SEC).
3.4	Certificate of Designation of Series A Preferred Stock (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K, filed March 30, 2023 with the SEC).
3.5	Amended and Restated By-Laws of the Registrant (incorporated by reference to Exhibit 3.3 to the Registrant's Annual Report on Form 10-K, filed March 8, 2018 with the SEC).
4.1	Description of Capital Stock (incorporated by reference to Registrant's Registration Statement filed on Form S-3, filed April 4, 2023 with the SEC).
4.2	Form of Warrant (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K, filed March 30, 2023 with the SEC).
10.1	First Amended and Restated Stockholders Agreement, dated as of March 3, 2020, by and among the Registrant, JPMC Heritage Parent LLC, Heritage PE (OEP)Heritage Parent LLC, Heritage PE (OEP) III, L.P. and ECI Holding (Hungary) Kft (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed March 3, 2020 with the SEC).
10.2 +	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).
10.3 +	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).
10.4 +	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).
10.5 +	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).
10.6 +	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).
10.7 +	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).
10.8 +	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).
10.9 +	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).
10.10 +	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).

10.11 +	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).
10.12	Senior Secured Credit Facilities Credit Agreement, dated March 3, 2020, among the Company, as guarantor, Ribbon Communications Operating Company, Inc., as the borrower, Citizens Bank, N.A., as administrative agent, a lender, issuing lender, swingline lender, joint lead arrangers and bookrunner, Santander Bank, National Association, as a lender, joint lead arranger and bookrunner, and the other lenders party thereto (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed March 4, 2020 with the SEC).
10.13	First Amendment to Credit Agreement, dated August 18, 2020, among Ribbon Communications Operating Company, Inc., as the borrower and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed August 24, 2020 with the SEC).
10.14	Second Amendment to Credit Agreement and Consent, dated December 1, 2020, among Ribbon Communications Operating Company, Inc., as the borrower and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.23 to the Registrant's Annual Report on Form 10-K, filed February 26, 2021 with the SEC).
10.15	Third Amendment to Credit Agreement, dated March 3, 2021, among Ribbon Communications Operating Company, Inc., as the borrower, the guarantors party thereto, the financial institutions party thereto as lenders, and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed March 4, 2021 with the SEC).
10.16	Fourth Amendment to Credit Agreement, dated March 11, 2022, among Ribbon Communications Operating Company, Inc., as the borrower, the guarantors party thereto, the financial institutions party thereto as lenders, and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.45 to the Registrant's Annual Report on Form 10-K, filed March 11, 2022 with the SEC).
10.17	Fifth Amendment to Credit Agreement, dated June 30, 2022, among Ribbon Communications Operating Company, Inc., as the borrower, the guarantors party thereto, the financial institutions party thereto as lenders, and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed July 5, 2022 with the SEC).
10.18	Sixth Amendment to Credit Agreement, dated March 24, 2023, among Ribbon Communications Operating Company, Inc., as the borrower, the guarantors party thereto, the financial institutions party thereto as lenders, and Citizens Bank, N.A., as administrative agent (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed March 30, 2023 with the SEC).
10.19 +	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).
10.20 +	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).
10.21 +	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).
10.22 +	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).
10.23 +	Letter Agreement, dated as of 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 10.1 to the Registrant's Current Report on Form 8-K, filed February 19, 2020 with the SEC.
10.24 +	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).
10.25 +	Form of Restricted Stock Unit Award Agreement (Performance-Based Vesting) between Ribbon Communications Inc. and Bruce McClelland (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K, filed February 19, 2020 with the SEC).
10.26 +	Employment Agreement between the Registrant and Miguel Lopez, dated June 22, 2020 (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed June 23, 2020 with the SEC).

10.27 +	Severance Agreement between the Registrant and Miguel Lopez, dated June 22, 2020 (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K, filed June 23, 2020 with the SEC).
10.28 +	Ribbon Communications Inc. Amended and Restated 2019 Incentive Award Plan (incorporated by reference to Exhibit 99.1 to the Registrant's Form S-8 Registration Statement, filed June 2, 2020 with the SEC).
10.29	Amendment No. 1 to the Ribbon Communications, Inc. Amended and Restated 2019 Incentive Award Plan (incorporated by reference to Appendix A to the Registrant's Definitive Proxy Statement on Schedule 14A filed on April 8, 2022 with the SEC).
10.30 +	Employment Agreement, dated May 26, 2020, between the Registrant and Patrick Macken (incorporated by reference to Exhibit 10.4 to the Registrant's Quarterly Report on Form 10-Q, filed April 30, 2021 with the SEC).
10.31 +	Severance Agreement, dated May 26, 2020, between the Registrant and Patrick Macken (incorporated by reference to Exhibit 10.5 to the Registrant's Quarterly Report on Form 10-Q, filed April 30, 2021 with the SEC).
10.32 +	Employment Agreement, dated July 21, 2020, between the Registrant and Sam Bucci (incorporated by reference to Exhibit 10.6 to the Registrant's Quarterly Report on Form 10-Q, filed April 30, 2021 with the SEC).
10.33 +	Severance Agreement, dated September 7, 2020, between the Registrant and Sam Bucci (incorporated by reference to Exhibit 10.7 to the Registrant's Quarterly Report on Form 10-Q, filed April 30, 2021 with the SEC).
10.34	Form of Securities Purchase Agreement, dated August 12, 2022, by and among Ribbon Communications Inc. and each purchaser identified on the signature pages thereto (incorporated by reference to Exhibit 10.1 to the Registrant's Current Report on Form 8-K, filed August 16, 2022 with the SEC).
10.35	Form of Second Amended and Restated Registration Right Agreement, dated August 12, 2022, by an among Ribbon Communications Inc. and its stockholders that are parties thereto (incorporated by reference to Exhibit 10.2 to the Registrant’s Current Report on Form 8-K, filed August 16, 2022 with the SEC).
10.36	Form of Securities Purchase Agreement, dated March 28, 2023, by and among Ribbon Communications Inc. and each purchaser identified on the signature pages thereto (incorporated by reference to Exhibit 10.2 to the Registrant's Current Report on Form 8-K, filed March 30, 2023 with the SEC).
10.37	Warrant Agreement, dated March 30, 2023, between the Company and American Stock Transfer & Trust Company, LLC (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K, filed March 30, 2023 with the SEC).
21.1 *	Subsidiaries of the Registrant.
23.1 *	Consent of Independent Registered Public Accounting Firm, Deloitte & Touche LLP
31.1 *	Certification of Ribbon Communications Inc. Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2 *	Certification of Ribbon Communications Inc. Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1 #	Certification of Ribbon Communications Inc. Chief Executive Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2 #	Certification of Ribbon Communications Inc. Chief Financial Officer Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
97 *	Ribbon Communications Inc. Clawback Policy.
101.INS *	Inline XBRL Instance Document
101.SCH *	Inline XBRL Taxonomy Extension Schema
101.CAL *	Inline XBRL Taxonomy Extension Calculation Linkbase
101.DEF *	Inline XBRL Taxonomy Extension Definition Linkbase
101.LAB *	Inline XBRL Taxonomy Extension Label Linkbase
101.PRE *	Inline XBRL Taxonomy Extension Presentation Linkbase
104 *	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)

* 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, 2024

By: /s/ Bruce McClelland
Bruce McClelland
President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

Signature	Title	Date
/s/ Bruce McClelland Bruce McClelland	President, Chief Executive Officer and Director (Principal Executive Officer)	February 28, 2024
/s/ Miguel A. Lopez Miguel A. Lopez	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 28, 2024
/s/ Eric Marmurek Eric Marmurek	Senior Vice President, Finance, Chief Accounting Officer (Principal Accounting Officer)	February 28, 2024
/s/ Shaul Shani Shaul Shani	Chairman	February 28, 2024
/s/ Stewart Ewing Stewart Ewing	Director	February 28, 2024
/s/ Bruns H. Grayson Bruns H. Grayson	Director	February 28, 2024
/s/ Beatriz V. Infante Beatriz V. Infante	Director	February 28, 2024
/s/ Scott Mair Scott Mair	Director	February 28, 2024
/s/ Rick W. Smith Rick W. Smith	Director	February 28, 2024
/s/ Tanya Tamone Tanya Tamone	Director	February 28, 2024

EXHIBIT 21.1

RIBBON COMMUNICATIONS INC.
SUBSIDIARIES OF THE REGISTRANT

Name	Jurisdiction of Incorporation
Network Equipment Technologies, Inc.	Delaware
Ribbon Communications Operating Company, Inc.	Delaware
Ribbon Communications Federal Inc.	Delaware
Sonus Networks, Inc.	Delaware
GENBAND Inc.	Massachusetts
ECI de Argentina S.A.	Argentina
Ribbon Communications Australia Pty Ltd	Australia
Ribbon Communications do Brasil Ltda.	Brazil
Ribbon Communications Canada ULC	Canada
Ribbon Networks Communications Chile Limitada	Chile
Ribbon Communications Shanghai Co., Ltd.	China
Ribbon Communications Shanghai Co., LTD Hangzhou Branch	China
Ribbon Communications Sur America Ltda.	Colombia
Ribbon Communications Costa Rica S.A.	Costa Rica
Ribbon Communications Czech Republic s.r.o.	Czech Republic
Ribbon Communications France EURL	France
Ribbon Communications Germany GmbH	Germany
Ribbon Communications Hong Kong Limited	Hong Kong
GENBAND Telecommunications Private Limited	India
Ribbon Communication Pvt. Ltd.	India
ECI Telecom India Private Limited	India
Ribbon Communications International Ltd.	Ireland
Ribbon Communications Israel Ltd.	Israel
ECI Telecom Group Ltd.	Israel
ECI Telecom Ltd.	Israel
Negev Telecom Ltd.	Israel
Ribbon Communications Italy S.R.L.	Italy
Ribbon Communications Kabushiki Kaisha	Japan
Ribbon Communications Malaysia Sdn. Bhd.	Malaysia
Ribbon Communications Mexico S. de R.L. de C.V.	Mexico
GENBAND Canada B.V.	Netherlands
Ribbon Networks B.V.	Netherlands
GENBAND NS B.V.	Netherlands
Ribbon Communications B.V.	Netherlands
ECI Telecom (PH), Inc.	Philippines
Ribbon Communications Polska sp.z.o.o.	Poland
Ribbon Communications Rus Limited Liability Company	Russia
ECI Telecom 2005 LLC	Russia

Ribbon Networks Saudi Arabia for Information Technology	Saudi Arabia
Ribbon Communications Singapore Pte. Ltd.	Singapore
Ribbon Communications Spain, S.L.	Spain
Ribbon Communications Switzerland GmbH	Switzerland
Ribbon Networks Co., Ltd.	Taiwan
Ribbon Communications Operating Company, Inc.	Thailand
ECI Telecom Ukraine LLC	Ukraine
Ribbon Networks B.V. Dubai Branch	United Arab Emirates
Ribbon Communications UK Limited	United Kingdom
The Representative Office of Ribbon Networks B.V. in Hanoi City	Vietnam

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement No. 333-267415 and 333-271117 on Form S-3 and Registration Statement Nos. 333-221240, 333-226624, 333-232946, 333-237224, 333-238888, and 333-266412, on Form S-8 of our reports dated February 28, 2024, relating to the financial statements of Ribbon Communications Inc. and the effectiveness of Ribbon Communications Inc.'s internal control over financial reporting, appearing in this Annual Report on Form 10-K of Ribbon Communications Inc. for the year ended December 31, 2023.

/s/ Deloitte & Touche LLP

Dallas, Texas
February 28, 2024

EXHIBIT 31.1

CERTIFICATION

I, Bruce McClelland, certify that:

1. I have reviewed this Annual Report on Form 10-K of Ribbon Communications Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 28, 2024

/s/ Bruce McClelland

Bruce McClelland
President and Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 31.2

CERTIFICATION

I, Miguel A Lopez, certify that:

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

Date: February 28, 2024

/s/ Miguel A. Lopez

Miguel A. Lopez
Executive Vice President and Chief Financial Officer
(Principal Financial Officer)

EXHIBIT 32.1

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

In connection with the Annual Report on Form 10-K of Ribbon Communications Inc. (the "Company") for the period ended December 31, 2023 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Bruce McClelland, President and Chief Executive Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 28, 2024

/s/ Bruce McClelland

Bruce McClelland
President and Chief Executive Officer
(Principal Executive Officer)

EXHIBIT 32.2

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

In connection with the Annual Report on Form 10-K of Ribbon Communications Inc. (the "Company") for the period ended December 31, 2023 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Miguel A. Lopez, Chief Financial Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to his knowledge:

(1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 28, 2024

/s/ Miguel A. Lopez

Miguel A. Lopez
Executive Vice President and Chief Financial Officer (Principal Financial Officer)

EXHIBIT 97

RIBBON COMMUNICATIONS INC.

CLAWBACK POLICY

The Board of Directors (the “Board”) of Ribbon Communications Inc. (the “Company”) has adopted the following Clawback Policy (this “Policy”), effective as of October 2, 2023 (the “Effective Date”).

1. **Purpose**. The purpose of this Policy is to provide for the recoupment of certain incentive compensation pursuant to Section 954 of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, in the manner required by Section 10D of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), Rule 10D-1 promulgated thereunder, and the Applicable Listing Standards (as defined below) (collectively, the “Dodd-Frank Rules”).

2. **Administration**. This Policy shall be administered by the Compensation Committee of the Board of Directors (the “Compensation Committee”). Any determinations made by the Compensation Committee shall be final and binding on all affected individuals.

3. **Definitions**. For purposes of this Policy, the following capitalized terms shall have the meanings set forth below.

(a) “***Accounting Restatement***” shall mean an accounting restatement of the Company’s financial statements due to the material noncompliance of the Company with any financial reporting requirement under the securities laws, including any required accounting restatement (i) to correct an error in previously issued financial restatements that is material to the previously issued financial statements (*i.e.,* a “Big R” restatement), or (ii) that would result in a material misstatement if the error were corrected in the current period or left uncorrected in the current period (*i.e.,* a “little r” restatement).

(b) “***Affiliate***” shall mean each entity that directly or indirectly controls, is controlled by, or is under common control with the Company.

(c) “***Applicable Exchange”*** shall mean (i) The Nasdaq Stock Market, if the Company’s securities are listed on such national stock exchange, or (ii) the New York Stock Exchange, if the Company’s securities are listed on such national stock exchange.

(d) “***Applicable Listing Standards***” shall mean (i) Nasdaq Listing Rule 5608, if the Company’s securities are listed on The Nasdaq Stock Market, or (ii) Section 303A.14 of the New York Stock Exchange Listed Company Manual, if the Company’s securities are listed on the New York Stock Exchange.

(e) “***Clawback Eligible Incentive Compensation***” shall mean Incentive-Based Compensation Received by a Covered Executive (i) on or after the Effective Date, (ii) after beginning service as a Covered Executive, (iii) if such individual served as a Covered Executive at any time during the performance period for such Incentive-Based Compensation (irrespective of whether such individual continued to serve as a Covered Executive upon or following the Trigger Date), (iv) while the Company has a class of securities listed on a national securities exchange or a national securities association, and (v) during the applicable Clawback Period.

(f) “***Clawback Period***” shall mean, with respect to any Accounting Restatement, the three completed fiscal years of the Company immediately preceding the Trigger Date and any transition period (that results from a change in the Company’s fiscal year) within or immediately following those three completed fiscal years (except that a transition period between the last day of the Company’s previous fiscal year end and the first day of its new fiscal year that comprises a period of at least nine months shall count as a completed fiscal year).

(g) “***Company Group***” shall mean the Company and its Affiliates.

(h) “***Covered Executive***” shall mean any “executive officer” of the Company as defined under the Dodd-Frank Rules, and, for the avoidance of doubt, includes each individual identified as an executive officer of the Company in accordance with Item 401(b) of Regulation S-K under the Exchange Act.

(i) “***Erroneously Awarded Compensation***” shall mean, the amount of Clawback Eligible Incentive Compensation that exceeds the amount of Incentive-Based Compensation that otherwise would have been Received had it been determined based on the restated amounts, computed without regard to any taxes paid. With respect to any compensation plan or program that takes into account Incentive-Based Compensation, the amount contributed to a notional account that exceeds the amount that otherwise would have been contributed had it been determined based on the restated amount, computed without regard to any taxes paid, shall be considered Erroneously Awarded Compensation, along with earnings accrued on that notional amount.

(j) "***Financial Reporting Measures***" shall mean measures that are determined and presented in accordance with the accounting principles used in preparing the Company's financial statements, and all other measures that are derived wholly or in part from such measures. Stock price and total shareholder return (and any measures that are derived wholly or in part from stock price or total shareholder return) shall for purposes of this Policy be considered Financial Reporting Measures. For the avoidance of doubt, a measure need not be presented in the Company's financial statements or included in a filing with the U.S. Securities and Exchange Commission (the "SEC") in order to be considered a Financial Reporting Measure.

(k) "***Incentive-Based Compensation***" shall mean any compensation that is granted, earned or vested based wholly or in part upon the attainment of a Financial Reporting Measure.

(l) "***Received***" shall mean the deemed receipt of Incentive-Based Compensation. Incentive-Based Compensation shall be deemed received for this purpose in the Company's fiscal period during which the Financial Reporting Measure specified in the applicable Incentive-Based Compensation award is attained, even if payment or grant of the Incentive-Based Compensation occurs after the end of that period.

(m) "***Trigger Date***" shall mean the earlier to occur of (i) the date the Board, a committee of the Board, or the officer(s) of the Company authorized to take such action if Board action is not required, concludes, or reasonably should have concluded, that the issuer is required to prepare an Accounting Restatement, or (ii) the date a court, regulator or other legally authorized body directs the issuer to prepare an Accounting Restatement.

4. **Recoupment of Erroneously Awarded Compensation**. In the event of an Accounting Restatement, the Compensation Committee shall recoup Erroneously Awarded Compensation reasonably promptly, in the manner described below.

(a) ***Process.*** The Compensation Committee shall follow the following process for recoupment:

(i) First, the Compensation Committee will determine the amount of any Erroneously Awarded Compensation for each Covered Executive in connection with such Accounting Restatement. For Incentive-Based Compensation based on (or derived from) stock price or total shareholder return where the amount of Erroneously Awarded Compensation is not subject to mathematical recalculation directly from the information in the applicable Accounting Restatement, the amount shall be determined by the Compensation Committee based on a reasonable estimate of the effect of the Accounting Restatement on the stock price or total shareholder return upon which the Incentive-Based Compensation was Received (in which case, the Company shall maintain documentation of such determination of that reasonable estimate and provide such documentation to the Applicable Exchange).

(ii) Second, the Compensation Committee will provide each affected Covered Executive with a written notice stating the amount of the Erroneously Awarded Compensation, a demand for recoupment, and the means of recoupment that the Company will accept.

(b) ***Means of Recoupment.*** The Compensation Committee shall have discretion to determine the appropriate means of recoupment of Erroneously Awarded Compensation, which may include without limitation: (i) recoupment of cash or shares of Company stock, (ii) forfeiture of unvested cash or equity awards (including those subject to service-based and/or performance-based vesting conditions), (iii) cancellation of outstanding vested cash or equity awards (including those for which service-based and/or performance-based vesting conditions have been satisfied), (iv) to the extent consistent with Section 409A of the Internal Revenue Code of 1986, as amended ("Section 409A"), offset of other amounts owed to the Covered Executive or forfeiture of deferred compensation, (v) reduction of future compensation, and (vi) any other remedial or recovery action permitted by law. Notwithstanding the foregoing, the Company Group makes no guarantee as to the treatment of such amounts under Section 409A and shall have no liability with respect thereto. Except as set forth in Section 4(d) below, in no event may the Company Group accept an amount that is less than the amount of Erroneously Awarded Compensation in satisfaction of a Covered Executive's obligations hereunder.

(c) ***Failure to Repay.*** To the extent that an Covered Executive fails to repay all Erroneously Awarded Compensation to the Company Group when due (as determined in accordance with Section 4(b) above), the Company shall, or shall cause one or more other members of the Company Group to, take all actions reasonable and appropriate to recoup such Erroneously Awarded Compensation from the applicable Covered Executive. The applicable Covered Executive shall be required to reimburse the Company Group for any and all expenses reasonably incurred (including legal fees) by the Company Group in recouping such Erroneously Awarded Compensation in accordance with the immediately preceding sentence.

(d) ***Exceptions.*** Notwithstanding anything herein to the contrary, the Company shall not be required to recoup Erroneously Awarded Compensation if one of the following conditions is met and the Compensation Committee determines that recoupment would be impracticable:

(i) The direct expense paid to a third party to assist in enforcing this Policy against a Covered Executive would exceed the amount to be recouped, after the Company has made a reasonable attempt to recoup the applicable Erroneously Awarded Compensation, documented such attempts, and provided such documentation to the Applicable Exchange;

(ii) Recoupment would violate home country law where that law was adopted prior to November 28, 2022, provided that, before determining that it would be impracticable to recoup any amount of Erroneously Awarded Compensation based on violation of home country law, the Company has obtained an opinion of home country counsel, acceptable to the Applicable Exchange, that recoupment would result in such a violation and a copy of the opinion is provided to the Applicable Exchange; or

(iii) Recoupment would likely cause an otherwise tax-qualified retirement plan, under which benefits are broadly available to employees, to fail to meet the requirements of 26 U.S.C. 401(a)(13) or 26 U.S.C. 411(a) and regulations thereunder.

5. Reporting and Disclosure. The Company shall file all disclosures with respect to this Policy in accordance with the requirements of the Exchange Act and Applicable Listing Standards.

6. Indemnification Prohibition. No member of the Company Group shall be permitted to indemnify any current or former Covered Executive against (i) the loss of any Erroneously Awarded Compensation that is recouped pursuant to the terms of this Policy, or (ii) any claims relating to the Company Group's enforcement of its rights under this Policy. The Company may not pay or reimburse any Covered Executive for the cost of third-party insurance purchased by a Covered Executive to fund potential recoupment obligations under this Policy.

7. Acknowledgment. To the extent required by the Compensation Committee, each Covered Executive shall be required to sign and return to the Company the acknowledgement form attached hereto as Exhibit A pursuant to which such Covered Executive will agree to be bound by the terms of, and comply with, this Policy. For the avoidance of doubt, each Covered Executive will be fully bound by, and must comply with, the Policy, whether or not such Covered Executive has executed and returned such acknowledgment form to the Company.

8. Interpretation. The Compensation Committee is authorized to interpret and construe this Policy and to make all determinations necessary, appropriate, or advisable for the administration of this Policy. The Compensation Committee intends that this Policy be interpreted consistent with the Dodd-Frank Rules.

9. Effective Date and Retroactive Application. The Policy shall be effective as of the Effective Date, provided that amounts approved, awarded, granted, or paid prior to the Effective Date shall be subject to recoupment in accordance with the terms herein. In addition, the Compensation Committee may effect recoupment under this Policy as described in Section 4(b) from amounts approved, awarded, granted or paid prior to the Effective Date.

10. Amendment; **Termination**. The Compensation Committee may amend or terminate this Policy from time to time in its discretion, including as and when it determines that it is legally required to do so by any federal securities laws, SEC rule or the rules of any national securities exchange or national securities association on which the Company's securities are listed.

11. Other Recoupment Rights. The Compensation Committee intends that this Policy be applied to the fullest extent of the law. The Compensation Committee may require that any employment agreement, equity award, cash incentive award, or any other agreement entered into on or after the Effective Date be conditioned upon the Covered Executive's agreement to abide by the terms of this Policy. Any right of recoupment under this Policy is in addition to, and not in lieu of, any other remedies or rights of recoupment that may be available to the Company Group, whether arising under applicable law, regulation or rule, pursuant to the terms of any other policy of the Company Group, pursuant to any employment agreement, equity award, cash incentive award, or other agreement applicable to a Covered Executive, or otherwise (the "Separate Clawback Rights"). Notwithstanding the foregoing, there shall be no duplication of recovery of the same Erroneously Awarded Compensation under this Policy and the Separate Clawback Rights, unless required by applicable law.

12. **Successors**. This Policy shall be binding and enforceable against all Covered Executives and their beneficiaries, heirs, executors, administrators or other legal representatives.

Exhibit A

RIBBON COMMUNICATIONS INC.

CLAWBACK POLICY

ACKNOWLEDGEMENT FORM

By signing below, the undersigned acknowledges and confirms that the undersigned has received and reviewed a copy of the Ribbon Communications Inc. Clawback Policy (the "***Policy***"). Capitalized terms used but not otherwise defined in this Acknowledgement Form (this "***Acknowledgement Form***") shall have the meanings ascribed to such terms in the Policy.

By signing this Acknowledgement Form, the undersigned acknowledges and agrees that the undersigned is and will continue to be subject to the Policy and that the Policy will apply both during and after the undersigned's employment with the Company Group. Further, by signing below, the undersigned agrees to abide by the terms of the Policy, including, without limitation, by returning any Erroneously Awarded Compensation to the Company Group reasonably promptly to the extent required by, and in a manner permitted by, the Policy, as determined by the Compensation Committee of the Company's Board of Directors in its sole discretion.

Sign: ______________________________
Name: [Employee]

Date: ______________________________