



2017 Annual Report

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

(Mark One)

- ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the Fiscal Year Ended December 31, 2017
- TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
Commission File No. 000-25826

HARMONIC INC.

(Exact name of Registrant as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

77-0201147

(I.R.S. Employer
Identification Number)

4300 North First Street
San Jose, CA 95134
(408) 542-2500

(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

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

<u>Title of Each Class</u>	<u>Name of Each Exchange on Which Registered</u>
Common Stock, par value \$.001 per share	The NASDAQ Stock Market LLC

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 15(d) of the Exchange Act. Yes No

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

Indicate by check mark whether the Registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the Registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of the Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting 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. (Check one):

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input checked="" type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/> (Do not check if a smaller reporting company)	Smaller reporting company	<input type="checkbox"/>
Emerging growth company	<input type="checkbox"/>		

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

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

Based on the closing sale price of the Common Stock on The NASDAQ Global Select Market on June 30, 2017, the aggregate market value of the voting Common Stock held by non-affiliates of the Registrant was approximately \$157,264,000. Shares of Common Stock held by each executive officer and director and by each person who owns 5% or more of the outstanding Common Stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

The number of shares outstanding of the Registrant's Common Stock, \$.001 par value, was 84,097,572 on February 28, 2018.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for the Registrant's 2017 Annual Meeting of Stockholders (which will be filed with the Securities and Exchange Commission within 120 days of the end of the fiscal year ended December 31, 2017) are incorporated by reference in Part III of this Annual Report on Form 10-K.

HARMONIC INC.
FORM 10-K
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Forward Looking Statements

Some of the statements contained in this Annual Report on Form 10-K are forward-looking statements that involve risk and uncertainties. The statements contained in this Annual Report on Form 10-K that are not purely historical are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the “Securities Act”), and Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), including, without limitation, statements regarding our expectations, beliefs, intentions or strategies regarding the future. In some cases, you can identify forward-looking statements by terminology such as, “may,” “will,” “should,” “expects,” “plans,” “anticipates,” “believes,” “intends,” “estimates,” “predicts,” “potential,” or “continue” or the negative of these terms or other comparable terminology. These forward-looking statements include, but are not limited to, statements regarding:

- developing trends and demands in the markets we address, particularly emerging markets;
- economic conditions, particularly in certain geographies, and in financial markets;
- new and future products and services;
- capital spending of our customers;
- our strategic direction, future business plans and growth strategy;
- industry and customer consolidation;
- expected demand for and benefits of our products and services;
- seasonality of revenue and concentration of revenue sources;
- expectations regarding the impact of our acquisition of Thomson Video Networks (“TVN”);
- expectations regarding our CableOS software-based CCAP solutions;
- expectations regarding the impact of the Warrant issued to Comcast on our business;
- potential future acquisitions and dispositions;
- anticipated results of potential or actual litigation;
- our competitive environment;
- the impact of our restructuring plans;
- the impact of governmental regulation;
- anticipated revenue and expenses, including the sources of such revenue and expenses;
- expected impacts of changes in accounting rules;
- expectations regarding the usability of our inventory and the risk that inventory will exceed forecasted demand;
- expectations and estimates related to goodwill and intangible assets and their associated carrying value;
- use of cash, cash needs and ability to raise capital; and

These statements are subject to known and unknown risks, uncertainties and other factors, which may cause our actual results to differ materially from those implied by the forward-looking statements. Important factors that may cause actual results to differ from expectations include those discussed in “Risk Factors” beginning on page 13 in this Annual Report on Form 10-K. All forward-looking statements included in this Annual Report on Form 10-K are based on information available to us on the date thereof, and we assume no obligation to update any such forward-looking statements. The terms “Harmonic,” “Company,” “we,” “us,” “its,” and “our”, as used in this Annual Report on Form 10-K, refer to Harmonic Inc. and its subsidiaries and its predecessors as a combined entity, except where the context requires otherwise.

PART I

Item 1. BUSINESS

We develop and sell (i) versatile and high performance video delivery software, products, system solutions and services that enable our customers to efficiently create, prepare, store, playout and deliver a full range of high-quality broadcast and “over-the-top” (OTT) video services to consumer devices, including televisions, personal computers, laptops, tablets and smart phones and (ii) cable access solutions that enable cable operators to more efficiently and effectively deploy high-speed internet, voice and video services to consumers’ homes.

We operate in two segments, Video and Cable Edge. Our Video business sells video processing and production and playout solutions and services worldwide to cable operators and satellite and telecommunications (telco) pay-TV service providers, which we refer to collectively as “service providers,” and to broadcast and media companies, including streaming new media companies. Our Video business infrastructure solutions are delivered either through shipment of our products, software licenses or as software-as-a-service (“SaaS”) subscriptions. Our Cable Edge business sells cable access solutions and related services, including our CableOS software-based Converged Cable Access Platform (CCAP) solutions, primarily to cable operators globally.

Across our two business segments, we derived approximately 48% of our revenue from the Americas in 2017. The Europe, Middle East and Africa (EMEA) and Asia Pacific (APAC) regions accounted for the remaining 33% and 19% of our 2017 revenue, respectively.

Harmonic was initially incorporated in California in June 1988, and was reincorporated in Delaware in May 1995. Our principal executive offices are located at 4300 North First Street, San Jose, California 95134. Our telephone number is (408) 542-2500. Our Internet website is <http://www.harmonicinc.com>. Other than the information expressly set forth in this Annual Report on Form 10-K, the information contained or referred to on our website is not part of this report.

Industry Overview and Market Trends

Video Business

We believe our customers must continue to employ innovative technologies and services to address key trends in the dynamic video industry.

- *Demand for Video Services Anytime, Anywhere, on any Device.* In our ubiquitous multiscreen video environment, video programming and content needs to be transformed into multiple formats, bit rates and resolutions for display on a broad range of devices.
- *Demand for High Quality Video.* Consumer demand for high quality video anytime, anywhere and on any device requires ever-increasing bandwidth capacity in service providers’ networks, as well as technology that maximizes network bandwidth efficiency. With the advent of Ultra High Definition (Ultra HD) televisions and OTT services increasingly being rendered in “4K” high resolution and consuming approximately four times the bandwidth of traditional HD channels, we believe next generation compression technologies, such as High Efficiency VideoCompression (HEVC) or advances in H.264/AVC codecs, as well as increasing requirements for HDR encoding, will continue to remain a high priority for distributors of video.
- *Streaming Video Service.* Consumer demand for video download and streaming services from new media companies such as Netflix, Hulu, Google (YouTube), Amazon (Prime Video) and Apple (iTunes) continue to experience significant global growth. These and other similar services aggregate third-party and original content and stream video “over-the-top” (OTT) to any Internet-connected device utilizing Internet service providers’ networks at no incremental infrastructure cost to the consumer.
- *Time-Shifted Viewing.* “Time-shifting” technologies include digital video recorders (DVRs), cloud and network DVRs (cDVR and nDVR) that allow a subscriber to store programming on the service provider’s servers or in the cloud, and video-on-demand (VOD) services.

In response to these trends and the success of new media OTT streaming companies, as well as the growing trend of “cord-cutting” (i.e., consumers canceling traditional pay-TV subscriptions in favor of streaming services) and the increasing number of “cord-nevers” (i.e., consumers who have never had a pay-TV subscription):

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- service providers and broadcast and media companies continue to provide more of their own OTT streaming video services, including OTT streaming of live (or “linear”) television programming;
- service providers are competing to offer higher quality video signals in HD, including evolving initiatives to deliver video in 4K Ultra HD resolution;
- service providers are developing and expanding their content delivery and Internet Protocol (IP) networks, and increasing the capacity and efficiency of their networks with investments in various delivery infrastructure technologies to, among other things, maximize video quality and minimize bandwidth utilization;
- service providers continue to consolidate to achieve greater economies of scale and subscriber concentration, and acquire media companies to expand their content libraries and capabilities to develop original content;
- service providers continue to enhance and differentiate their content offerings, either through in-house development of new content or through acquisitions of existing content brands; and
- service providers have an ongoing need, despite the migration of traffic to OTT, to provide services over their existing broadcast distribution infrastructures.

We believe that the delivery of video over IP will continue to change traditional video viewing habits and distribution methods and may alter the traditional advertising and subscription business models of major service providers.

Our Video Markets

Service Providers

- *Cable Operators.* Cable operators continue to focus on various initiatives to improve and differentiate their service offerings from competing service providers, including: bundled digital video, voice and high speed data services; expansion of VOD libraries and on-demand and streaming service offerings; upgraded consumer-facing applications; video delivery over IP to broadband enabled consumer devices; and capacity enhancement of high-speed data services.
- *Satellite Operators.* Satellite operators around the world have established digital television services that serve tens of millions of subscribers, with the ability to provide tens of thousands of linear channels. We believe these linear services will continue to grow, particularly in emerging markets, while, in parallel, satellite operators launch new streaming services, such as Sling TV and DirecTV Now, to address younger generation viewers and new consumption habits.
- *Telcos.* Telcos have established video offerings to successfully compete in the video marketplace, including high-quality HD content, larger VOD libraries, time-shifting television services, bundled voice, data and video packages and, more recently, streaming services. In many cases, telcos are making significant infrastructure investments to expand their video offerings into IP services and gain market share, while certain telcos are also acquiring satellite and/or cable companies to achieve market reach and scale.

Broadcast and Media Companies

- Network broadcasters, programmers and content owners require video contribution and distribution solutions to transmit live programming of news and sports to their studios for subsequent broadcast, and deliver the same programming and content to service providers for distribution to their subscribers. Broadcasters generally produce their own news and sports highlight content, along with hundreds of channels of network programming that is played-to-air under strict reliability requirements using playout servers and software.
- With broadcast and media companies continuing to expand their offerings to support a wide range of live and linear content and making content available in higher quality video formats and on-demand, we believe these trends are accelerating demand for functionally collapsed playout systems with integrated media orchestration software, as well as increasing demand for media servers and video-optimized storage solutions equipped to support higher resolution formats. In addition, in order to achieve faster time-to-market and reduce operational costs, we believe content providers are adopting cloud-based technologies and transitioning portions of their operations into public cloud environments, thereby enabling expanded services at a more rapid pace, the distribution of video directly to consumers or to distributors over IP and public networks, and more efficient and scalable global operations.
- In the terrestrial broadcasting market, while broadcasters in various countries that have not yet completed converting from analog to digital transmission continue with change-over efforts, operators in numerous other

countries around the world are adopting the next generation of digital transmission technologies, such as the DVB-T2 standard and ATSC 3.0 standards. The ongoing conversion from analog to digital transmission and the adoption of next-generation transmission standards provides the opportunity to deliver new channels, HD and Ultra HD services, premium content, and interactive services.

Over-the-Top (OTT)

- According to a recent Cisco study, IP video traffic accounts for a significant majority of Internet traffic globally, and video traffic will only continue to increase for the foreseeable future. We believe service providers and broadcast and media companies with OTT services and offerings will continue to require high-quality video processing solutions and new technologies in order to process and distribute large amounts of live and VOD content from a wide variety of sources to a broad array of consumer devices, and to optimize adaptive bitrate video streaming quality and bandwidth utilization.
- With the continued proliferation of OTT streaming content and program channels similar to channels currently available from service providers, monetizing this content through the use of national, regionalized and personalized advertising delivered to the varied devices of individual viewers has become a key area of focus for companies with OTT offerings. We believe OTT ad insertion and other related content customization solutions will continue to attract increased investments from OTT companies.

Emerging Markets

- With a growing middle class across emerging markets, we believe the Pay-TV business is poised for growth over the coming decade in the Asia Pacific region, South Asia, the Middle East, Africa and Central and South America. We currently derive a meaningful portion of our revenue from countries in emerging markets.
- Many consumers who are entering the middle class are now able to afford a monthly video service to gain access to their favorite programs and movies. We believe some of the leading video service providers serving emerging markets will experience high subscriber growth rates and may become worldwide industry leaders.
- We believe subscribers in these markets will demand increasingly sophisticated video services over time as consumer consumption trends in these markets track to those in more developed markets. As a result, we believe that the infrastructure and technology investments of these service providers and new market entrants are likely to grow significantly for the foreseeable future.
- Media companies addressing emerging markets are aggressively investing in the creation of new content, particularly content that is localized and responsive to consumer demands, with the goal of creating strong brands and a growing, loyal customer base. We believe that this growth in content creation will require these media companies to significantly increase their investments in video storage, processing and related technologies.

Video Infrastructure Technology Trends

- *Network Function Virtualization.* We believe there is industry momentum towards network function virtualization, whereby core video chain functions are being re-engineered and collapsed to run on the latest Intel processors in order to leverage high-performance and scalable appliance-based hardware, and as software-only virtual instances designed to run on private or public cloud environments.
- *Unified Video Playout & Processing Systems.* In light of more complicated workflows inherent in managing the delivery of greater quantities of content across multiple formats to a growing population of set-top-boxes and consumer electronic devices, we believe the industry is moving towards unified video processing systems. These systems integrate what had been historically discrete hardware video processing functions into software, enabling significant cost efficiencies, greater flexibility and improved business agility across the entire video workplace. A unified video processing system also requires software-based channel origination and playout capabilities, with integrated functionality such as graphics and branding insertion and media orchestration, and an integrated control system that streamlines playout processes, improves video quality, enables time-shift and cDVR functionality, while reducing server overhead. Also, when playout functionality is deployed to the cloud, the compression and OTT packaging and origin functionality (in addition to the capability to distribute over traditional broadcast distribution networks) associated with the playout will necessarily also need to be deployed in the cloud.
- By combining historically discrete video chain functions into a unified playout and distribution system where content can be ingested, formatted, stored, played-to-air and compressed, packaged and delivered, we believe functionally collapsed video playout infrastructures with integrated control systems will enable content providers

to produce more channels in higher resolution formats faster and more cost-effectively, and provide content in the widest possible range of formats.

Cable Edge Business

Industry Challenges

Cable operators continue to face challenges from the rapid growth of demand for broadband bandwidth in their networks, driven primarily by:

- more users with more connected devices and applications;
- bundled digital video, voice and high speed data services; and
- bandwidth-intensive VOD and OTT streaming video services, and cloud applications.

In addition, the operation of network infrastructure is space, power and personnel intensive. Hardware-centric networks can also be expensive to update or replace. To remain competitive, especially in the face of heightened competition from non-cable service providers such as telcos to deliver gigabit data rates, cable operators need to incur significant capital expenditures to upgrade existing equipment and network technologies.

Technology Trends

- *CCAP*. In order to deliver gigabit data rates, cable operators are aggressively driving broadband access technologies such as the Converged Cable Access Platform (CCAP) architecture. The CCAP architecture combines edge “quadrature amplitude modulation” (QAM) and “cable modem termination system” (CMTS) functions in a single solution in order to combine resources for video and data services.
- *DOCSIS 3.1*. We believe the cable industry will move rapidly to DOCSIS 3.1, which enables increased bandwidth data transfer over existing broadband infrastructure.
- *Virtualization*. We believe cable operators are moving toward more software-driven architectures. Virtualized software solutions that are decoupled from underlying hardware and run on commercial off-the-shelf (COTS) servers allow for significantly increased efficiencies, upgradability, configuration flexibility, service agility and scalability not feasible with hardware-centric approaches. We believe a software-based, centralized CCAP-based system can significantly reduce cable headend costs, especially costs related to physical space and power consumption, and increase operational efficiency, and that the deployment of these systems will be an important step in cable operators’ transition to all-IP networks.
- *Distributed Architecture*. In addition to centralized CCAP systems, we believe there is growing interest in distributed Remote PHY solutions, particularly in competitive gigabit service markets where cable operators are competing with fiber-to-the-home (FTTH) services and are extending fiber networks deeper into their access networks. A Remote PHY architecture, which involves COTS servers running virtualized CCAP core software at a headend and the distribution of Remote PHY nodes closer to end users, alleviates the power and space requirements of centralized systems at headend sites due to the fact that the RF processing is distributed into the field outside of the headend. We believe this distributed architecture will enable service providers to efficiently scale to support data and IP video growth.

Our Products and Solutions

Video Processing and Delivery Solutions

We offer a range of products and solutions that address the demand and market trends shaping our industry, including next-generation software-based media processing platforms. Our video processing solutions, which include network management software and application software and hardware products, provide our customers with the ability to acquire a variety of signals from different sources and in different protocols in order to deliver a variety of real-time and stored content to their subscribers for viewing on a broad range of devices.

Cloud media processing. An increasing number of service providers and media professionals are looking to cloud-based architectures for their media processing workflows, which is a fundamental shift from traditional, hardware-based approaches. We have addressed, and continue to address, this changing landscape with our VOS Software Cluster (formerly VOS Cloud) software application, which transforms traditional video preparation and delivery architectures into a fully integrated set of cloud-native functions, accelerating the time to market for new broadcast and OTT services. Our VOS 360 offering provides these same capabilities through our software-as-a-service solution. We are also seeing customer demand for cloud-like

functionality but for deployment in traditional data centers, without the complexity and cost associated with a formal private cloud infrastructure. We address customers with these needs with our VOS Software Cluster software application which is compatible with traditional data center architectures.

Broadcast and distribution encoders. Our high-performance encoders compress video, audio and data channels to low bit rates while maintaining high video quality. Our latest software-based Electra encoders can deliver video in multiple formats, including standard, HD and Ultra HD, and in any video compression standard, including MPEG-2, MPEG-4 AVC and HEVC. This capability allows the encoders to converge workflows targeted for all forms of video delivery, whether broadcast, cable, satellite, IPTV or OTT. Today's Electra and VOS solutions all leverage the Harmonic PURE Compression Engine, a software-based technology that incorporates many of the encoding algorithm and processing techniques developed by Harmonic over the past two decades. The benefits of the PURE Compression Engine include a faster rate of video quality innovation, the ability to dynamically balance workflow efficiency and resource utilization, and improved investment protection. Our EyeQ real-time content-aware encoding solution is an optional enhancement for systems featuring PURE Compression. The EyeQ compression solution leverages the mechanics of the human eye to assess video quality and optimize encoding parameters in real time. Our VOS Software Cluster software application supports a subset of broadcast and distribution encoding functionality.

Contribution encoders. Our ViBE contribution encoders provide broadcasters with video compression solutions for real-time news gathering, live sports coverage and other remote events, and enable our customers to deliver these feeds to their studios for further processing. Our latest models can encode HD and Ultra HD video signals in HEVC or AVC 4:2:2 10-bit resolution, enabling the transmission of very high-quality video with low latency. Broadcasters and other operators also use our contribution encoders for delivery of their programming to their customers, which are typically cable, telco and satellite operators.

Multiscreen transcoders and stream processing. We offer high-density, real-time transcoding of video for broadcast and OTT delivery with our Electra XT Xstream transcoder. This scalable platform is designed to accelerate time to market for operators faced with fast channel lineup growth and a rise in multiscreen applications. Our latest ProStream X and ProStream XVM real-time stream processing systems are software-based and provide high-performance, high-throughput processing for mission-critical IP video delivery applications, including multiplexing, scrambling, splicing and blackout switching. Our VOS Software Cluster software application supports multiscreen transcoding and stream processing.

Multiscreen delivery. Our VOS Software Cluster software application enables the packaging and delivery of high-quality OTT services, including live streaming, VOD, catch-up TV, start-over TV, nDVR and cDVR services through hypertext transfer protocol (HTTP) streaming to any device. Capabilities include real-time and file-based transcoding, stream packaging, and multiscreen workflow management, as well as support for digital rights management (DRM) processes with a number of DRM partners. Our VOS Software Cluster application ingests transcoded, segmented and encrypted output from Electra systems to provide high-volume live adaptive bitrate streaming and the delivery of time-shifted services.

Decoders and descramblers. Our family of ProView integrated receivers-decoder (IRD) products allows service providers to acquire content delivered via satellite, IP or terrestrial networks for distribution to their subscribers. These products, including the ProView 7100 and ProView 8100, are used by broadcasters to decode signals backhauled from live news and sporting events in contribution applications, as well as by content owners looking to distribute their content in a controlled manner to a large base of video service providers. Our VOS Software Cluster software applications support a subset of these decoding and descrambling capabilities.

Video servers. Our video playout solutions, including media orchestration software, are based on scalable video servers used by broadcast and media companies to create and playout television channels. Our Spectrum family of video server systems are used by broadcast and media companies to create play-to-air television channels. Our customers typically use these video server products to record incoming content from either live feeds or from tapes, encoding that content in real-time into standard media files that are then stored in the server's file system until the content is needed for playback as part of a scheduled playlist. Clips stored in the server are decoded in real-time and played-to-air according to a playout schedule in a frame-accurate, back-to-back manner to create a seamless television channel. Our Spectrum servers support SD, HD and Ultra HD programming, as well as many different media formats. Our Polaris media orchestration software solutions work with our Spectrum products and provide our customers with playout management and control tools for channel-in-a-box and integrated channel playout applications. Our VOS Software Cluster software application supports a subset of these video server functionalities.

Video-optimized Storage

MediaGrid. Our MediaGrid shared storage system is a scale-out, network-attached storage system with a built-in media file system optimized for media production workflows. Architected as a clustered storage system with a distributed file system,

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MediaGrid provides highly scalable storage capacity and access bandwidth to support demanding media production applications, such as video editing, content transformation and media library management. In addition, MediaGrid systems are increasingly being employed for VOD, time-shifted television services and OTT adaptive bitrate streaming. Our VOS Software Cluster software application relies on external infrastructure for storage, and is compatible with MediaGrid video-optimized storage when deployed into a customer's traditional data center environment.

Unified Video Playout and Processing SaaS

Cloud-native SaaS solutions. Our VOS360 service provides the functionality of our VOS Software Cluster in public cloud environments and is designed to be deployable in any public cloud infrastructure. With the VOS360 service, the maintenance operations of the VOS Software Cluster are the responsibility of Harmonic.

Cable Edge Products and Solutions

Software-Based CCAP Solution. As demand continues to rapidly grow for high-speed broadband services such as OTT streaming, VOD, time-shift TV and cloud DVR, we believe we can help cable operators take advantage of this opportunity with our CableOS software-based CCAP, an end-to-end cable access solution that we believe delivers unprecedented scalability, agility and cost savings. CableOS enables the migration to multi-gigabit broadband capacity and the fast deployment of DOCSIS 3.1 data, video and voice services. We believe the solution resolves space and power constraints in the headend and hub, eliminates dependence on hardware upgrade cycles, and reduces total cost of ownership. Our CableOS solution can be deployed based on a centralized, distributed Remote PHY or hybrid architecture.

Edge QAM products. Our Narrowcast Services Gateway (NSG) products are fully integrated edge gateway products that integrate routing, multiplexing, scrambling and modulation into a single package for the delivery of narrowcast services to subscribers over cable networks. NSG systems allow cable operators to deliver IP signals from the headend to the edge of the network for subsequent modulation onto a HFC network. Originally developed for VOD applications, the NSG has evolved to support multiple applications, including switched digital video and modular CMTS applications, as well as large-scale VOD deployments.

CCAP systems are expected to, over time, replace and make obsolete current cable edge QAM products, as well as current CMTS products, since fully compliant CCAP-based solutions will combine the functionality of these products into one solution. Since we historically have not addressed the CMTS market, we believe that our CableOS solution, which includes a software-based CMTS, will have an opportunity to be sold into a significantly larger and growing market created by the CCAP standard as well as the distributed Remote PHY architecture, with Remote PHY nodes replacing traditional optical nodes.

Technical Support and Professional Services

We provide maintenance and support services to most of our customers under service level agreements that are generally renewed on an annual basis. We also provide consulting, implementation and integration services to our customers worldwide. We draw upon our expertise in broadcast television, communications networking and compression technology to design, integrate and install complete solutions for our customers, including integration with third-party products and services. We offer a broad range of services, including program management, technical design and planning, building and site preparation, integration and equipment installation, end-to-end system testing and comprehensive training.

Customers

We sell our products to a variety of cable, satellite and telco, and broadcast and media companies. Set forth below is a representative list of our significant end user and integrator/reseller customers, based, in part, on revenue during 2017.

United States

AT&T
Charter Communications
Comcast
Cox Communication
DigitalGlue
Dish Network
Heartland Video Systems
Ion Media Networks
Turner Broadcasting
Univision

International

Accenture BV
Bell Expressvu Inc.
Com Hem
Groupe Canal +SA
Huawei Technnologies Co. Ltd.
M7 Group SA
Nagravision SA Kudelski Group
Netorium GMBH
SCSK Corp.
Sky Servicios De Banda Larga LTDA

Sales to our 10 largest customers in 2017, 2016 and 2015 accounted for approximately 24%, 28% and 32% of our net revenue, respectively. Although we continue to seek to broaden our customer base by penetrating new markets and further expanding internationally, we expect to see continuing industry consolidation and customer concentration.

During 2017 and 2016, no single customer accounted for more than 10% of our net revenue. During 2015, revenue from Comcast accounted for approximately 12% of our net revenue, respectively. The loss of any significant customer, or any material reduction in orders from any significant customer, or our failure to qualify our new products with any significant customer could materially and adversely affect our operating results, financial condition and cash flows. In addition, we are involved in most quarters in one or more relatively large individual transactions. A decrease in the number of relatively larger individual transactions in which we are involved in any quarter could adversely affect our operating results for that quarter.

Sales and Marketing

In the U.S. and internationally, we sell our products through our own direct sales force, as well as through independent resellers and systems integrators. Our direct sales team is organized geographically and by major customers and markets to support customer requirements. Our principal sales offices outside of the U.S. are located in Europe and Asia, and we have a support center in Switzerland to support our international customers and operations. Our international resellers are generally responsible for importing our products and providing certain installation, technical support and other services to customers in their territory after receiving training from us.

Our direct sales force and resellers are supported by a highly trained technical staff, which includes application engineers who work closely with our customers to develop technical proposals and design systems to optimize system performance and economic benefits for our customers. Our technical support teams provide a customized set of services, as required, for ongoing maintenance, support-on-demand and training for our customers and resellers, both in our facilities and on-site.

Our product management organization develops strategies for product lines and markets and, in conjunction with our sales force, identifies the evolving technical and application needs of customers so that our product development resources can be most effectively and efficiently deployed to meet anticipated product requirements. Our product management organization is also responsible for setting price levels, demand forecasting and general support of the sales force, particularly at major accounts.

Our corporate marketing organization is responsible for building awareness of the Harmonic brand in our markets and driving engagement with our strategies, solutions and products. The group develops all of our corporate messaging and manages all customer and industry communication channels, including public relations, Web and social media, events and trade shows, as well as demand generation marketing campaigns in conjunction with our sales force.

Manufacturing and Suppliers

We rely on third-party contract manufacturers to assemble our products and the subassemblies and modules for our products. In 2003, we entered into an agreement with Plexus Services Corp. to act as our primary contract manufacturer. Plexus currently provides us with a majority, of the products we purchase from our contract manufacturers. This agreement has automatic annual renewals, unless prior notice for nonrenewal is given, and has been automatically renewed for a term expiring in October 2018. We do not generally maintain long-term agreements with any of our contract manufacturers.

Many components, subassemblies and modules necessary for the manufacture or integration of our products are obtained

from a sole supplier or a limited group of suppliers. While we expend considerable efforts to qualify additional component sources, consolidation of suppliers in the industry and the small number of viable alternatives have limited the results of these efforts. We do not generally maintain long-term agreements with any of our suppliers.

Intellectual Property

As of December 31, 2017, we held 74 issued U.S. patents and 46 issued foreign patents and had 94 patent applications pending. Although we attempt to protect our intellectual property rights through patents, trademarks, copyrights, licensing arrangements, maintaining certain technology as trade secrets and other measures, we cannot assure you that any patent, trademark, copyright or other intellectual property rights owned by us will not be invalidated, circumvented or challenged, that such intellectual property rights will provide competitive advantages to us, or that any of our pending or future patent applications will be issued with the claims, or the scope of the claims, sought by us, if at all. We cannot assure you that others will not develop technologies that are similar or superior to our technology, duplicate our technology or design around the patents that we own. In addition, effective patent, copyright and trade secret protection may be unavailable or limited in which we do business or may do business in the future.

We enter into confidentiality or license agreements with our employees, consultants, vendors and customers as needed, and generally limit access to, and distribution of, our proprietary information. However, no assurances can be given that these actions will prevent misappropriation of our technology. In addition, if necessary, we are prepared to take legal action, in the future, to enforce our patents and other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others, or to defend against claims of infringement or invalidity. Any such litigation could result in substantial costs and diversion of resources, including management time, and could negatively affect our business, operating results, financial position and cash flows.

In order to successfully develop and market our products, we may be required to enter into technology development or licensing agreements with third parties. Although many companies are often willing to enter into such technology development or licensing agreements, we cannot assure you that such agreements 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 and market new products and could harm our business.

Backlog

We schedule production of our products and solutions based upon our backlog, open contracts, informal commitments from customers and sales projections. Our backlog consists of firm purchase orders by customers. Approximately 76% of our backlog is projected to be converted to revenue within a rolling one-year period. Our backlog, including deferred revenue at December 31, 2017 was \$224.4 million. Delivery schedules on such orders may be deferred or canceled for a number of reasons, including reductions in capital spending by our customers or changes in specific customer requirements. In addition, due to annual capital spending budget cycles at many of our customers, the amount of our backlog at any given time is not necessarily indicative of actual revenues for any succeeding period.

Competition

The markets for video infrastructure systems are extremely competitive and have been characterized by rapid technological change and declining average selling prices. The principal competitive factors in these markets include product performance, functionality and features, reliability, pricing, breadth of product offerings, brand recognition and awareness, sales and distribution capabilities, technical support and services, and relationships with end customers. We believe that we compete favorably in each of these categories.

Our competitors in our Video business segment include vertically integrated system suppliers, such as Arris Group, Cisco Systems and Ericsson (which recently announced the sale of majority stake in its video technology business to a private equity firm), and, in certain product lines, other companies including ATEME and Elemental Technologies (an Amazon Web Services company). With respect to production and playout products, competitors include Evertz Microsystems, EVS, Grass Valley (a Belden brand) and Imagine Communications. Our competitors in our Cable Edge business include Arris, Casa Systems and Cisco Systems. In the OTT market, our competitors include internally developed technologies and solutions by companies such as Netflix, Facebook, Google and Microsoft, as well as end-to-end online video platforms such as Brightcove, who provide comprehensive OTT infrastructure solutions, some of which overlap with our products and services.

Consolidation in the industry has led to the acquisition of a number of our historic competitors over the last several years.

For example, Motorola Home, BigBand Networks and C-Cor were acquired by Arris; NDS and Scientific Atlanta were acquired by Cisco Systems; Envivio and Tandberg Television were acquired by Ericsson; Elemental Technologies was acquired by Amazon; and Miranda Technologies and Grass Valley were acquired by Belden Inc. Consequently, some of our principal competitors are substantially larger and have greater financial, technical, marketing and other resources than we have.

Research and Development

We have historically devoted a significant amount of our resources to research and development. Research and development expenses in 2017, 2016 and 2015 were approximately \$96.0 million, \$98.4 million and \$87.5 million, respectively. Research and development expenses as a percent of revenue in 2017, 2016 and 2015 were approximately 26.8%, 24.2% and 23.2%, respectively. Our internal research and development activities are conducted primarily in the United States (California, Oregon and New Jersey), France, Israel and Hong Kong. In addition, a portion of our research and development is conducted through third-party partners with engineering resources in Ukraine and in India.

Our research and development program is primarily focused on developing new products and systems, and adding new features and other improvements to existing products and systems. Our development strategy is to identify features, products and systems, in both software and hardware solutions, that are, or are expected to be, needed by our customers. For our Video business segment, our current research and development efforts are focused on next-generation video processing and delivery across different deployment environments, particularly cloud-native and SaaS delivery models, and enhanced video compression, video quality, and multiscreen solutions. We also devote significant resources to production and playout and distribution solutions. With respect to our Cable Edge business segment, our major research and development efforts are focused on cable edge solutions for both video and data, particularly the ongoing development of our centralized and distributed CableOS software-based CCAP solutions.

Our success in designing, developing, manufacturing and selling new or enhanced products will depend on a variety of factors, including the identification of market demand for new products, product selection, timely product design and development, product performance, effective manufacturing and assembly processes and sales and marketing. Because of the complexity inherent in such research and development efforts, we cannot assure you that we will successfully develop new products, or that new products developed by us will achieve market acceptance. Our failure to successfully develop and introduce new products would materially and adversely affect our business, operating results, financial condition and cash flows.

Employees

As of December 31, 2017, we employed a total of 1,244 full time employees, including 473 in research and development, 216 in sales, 301 in service and support, 66 in operations, 61 in marketing (corporate and product) and 127 in a general and administrative capacity. Of those employees, 435 were located in the U.S. and 809 employees were located in foreign countries in South America, the Middle East, Europe, Asia and Canada. From time to time, we also employ a number of temporary employees and consultants on a contract basis. Our employees in France are represented by labor unions and an employee works council. None of our other employees are represented by a labor union with respect to his or her employment with us. We have not experienced any work stoppages, and we consider our relations with our employees to be good.

Item 1A. RISK FACTORS

We depend on cable, satellite and telco, and broadcast and media industry capital spending for our revenue and any material decrease or delay in capital spending in any of these industries would negatively impact our operating results, financial condition and cash flows.

Our revenue has been derived from worldwide sales to service providers and broadcast and media companies, as well as, more recently, emerging streaming media companies. We expect that these markets will provide our revenue for the foreseeable future. Demand for our products will depend on the magnitude and timing of capital spending by customers in each of these markets for the purpose of creating, expanding or upgrading their systems. These capital spending patterns are dependent on a variety of factors, including:

- the impact of general economic conditions, actual and projected;
- access to financing;
- annual capital spending budget cycles of each of the industries we serve;
- the impact of industry consolidation;
- customers suspending or reducing capital spending in anticipation of: (i) new standards, such as HEVC and DOCSIS 3.1; (ii) industry trends and technology shifts, such as virtualization, and (iii) new products, such as products based on our VOS software platform or the CCAP architecture, such as CableOS;
- federal, state, local and foreign government regulation of telecommunications, television broadcasting and streaming media;
- overall demand for communication services and consumer acceptance of new video and data technologies and services;
- competitive pressures, including pricing pressures;
- the impact of fluctuations in currency exchange rates; and
- discretionary end-user customer spending patterns.

In the past, specific factors contributing to reduced capital spending have included:

- weak or uncertain economic and financial conditions in the U.S. or one or more international markets;
- uncertainty related to development of digital video industry standards;
- delays in evaluations of new services, new standards and systems architectures by many operators;
- emphasis by operators on generating revenue from existing customers, rather than from new customers, through construction, expansion or upgrades;
- a reduction in the amount of capital available to finance projects of our customers and potential customers;
- proposed and completed business combinations and divestitures by our customers and the length of regulatory review of each;
- completion of a new system or significant expansion or upgrade to a system; and
- bankruptcies and financial restructuring of major customers.

In the past, adverse economic conditions in one or more of the geographies in which we offer our products have adversely affected our customers' capital spending in those geographies and, as a result, our business. During challenging economic

times, and in tight credit markets, many customers may delay or reduce capital expenditures. This could result in reductions in revenue from our products, longer sales cycles, difficulties in collection of accounts receivable, slower adoption of new technologies and increased price competition. If global economic and market conditions, or economic conditions in the U.S., Europe or other key markets, deteriorate, we could experience a material and adverse effect on our business, results of operations, financial condition and cash flows. Additionally, since most of our international revenue is denominated in U.S. dollars, global economic and market conditions may impact currency exchange rates and cause our products to become relatively more expensive to customers in a particular country or region, which could lead to delayed or reduced capital spending in those countries or regions, thereby negatively impacting our business and financial condition.

In addition, industry consolidation has in the past constrained, and may in the future constrain or delay, capital spending by our customers. Further, if our product portfolio and product development plans do not position us well to capture an increased portion of the capital spending of customers in the markets on which we focus, our revenue may decline.

As a result of these potential capital spending issues, we may not be able to maintain or increase our revenue in the future, and our operating results, financial condition and cash flows could be materially and adversely affected.

The markets in which we operate are intensely competitive.

The markets for our products are extremely competitive and have been characterized by rapid technological change and declining average sales prices in the past. Our competitors in our Video business segment include vertically integrated system suppliers, such as Arris Group, Cisco Systems and Ericsson (which recently announced the sale of majority stake in its video technology business to a private equity firm), and, in certain product lines, other companies including ATEME and Elemental Technologies (an Amazon Web Services company). With respect to production and playout products, competitors include Evertz Microsystems, EVS, Grass Valley (a Belden brand) and Imagine Communications. Our competitors in our Cable Edge business include Arris, Casa Systems and Cisco Systems. In the OTT market, our competitors include internally developed technologies and solutions by companies such as Netflix, Facebook, Google and Microsoft, as well as end-to-end online video platforms such as Brightcove, who provide comprehensive OTT infrastructure solutions, some of which overlap with our products and services.

Many of our competitors are substantially larger, or as a result of consolidation activity have become larger, and have greater financial, technical, marketing and other resources than we have, and have been in operation longer than we have. Consolidation in the industry has led to the acquisition of a number of our historic competitors over the last several years. For example, Motorola Home, BigBand Networks and C-Cor were acquired by Arris; NDS and Scientific Atlanta were acquired by Cisco Systems; Envivio and Tandberg Television were acquired by Ericsson; Elemental Technologies was acquired by Amazon; and Miranda Technologies and Grass Valley were acquired by Belden Inc.

In addition, some of our larger competitors have more long-standing and established relationships with domestic and foreign customers. Many of these large enterprises are in a better position to withstand any significant reduction in capital spending by customers in our markets. They often have broader product lines and market focus, and may not be as susceptible to downturns in a particular market. These competitors may also be able to bundle their products together to meet the needs of a particular customer, and may be capable of delivering more complete solutions than we are able to provide. To the extent large enterprises that currently do not compete directly with us choose to enter our markets by acquisition or otherwise, competition would likely intensify.

Further, some of our competitors that have greater financial resources have offered, and in the future may offer, their products at lower prices than we offer for our competing products or on more attractive financing or payment terms, which has in the past caused, and may in the future cause, us to lose sales opportunities and the resulting revenue or to reduce our prices in response to that competition. Also, some competitors that are smaller than we are have engaged in, and may continue to engage in, aggressive price competition in order to gain customer traction and market share. Reductions in prices for any of our products could materially and adversely affect our operating margins and revenue.

Additionally, certain customers and potential customers have developed, and may continue to develop, their own solutions that may cause such customers or potential customers to not consider our product offerings or to displace our installed products with their own solutions. The growing availability of open source codecs and related software, as well as new server chipsets that incorporate encoding technology, has, in certain respects, lowered the barriers to entry for the video processing industry. The development of solutions by potential and existing customers and the reduction of the barriers to entry to enter the video processing industry could result in increased competition and adversely affect our results of operations and business.

If any of our competitors' products or technologies were to become the industry standard, our business could be seriously harmed. If our competitors are successful in bringing their products to market earlier than us, or if these products are more technologically capable than ours, our revenue could be materially and adversely affected.

We need to develop and introduce new and enhanced products in a timely manner to meet the needs of our customers and to remain competitive.

All of the markets we address are characterized by continuing technological advancement, changes in customer requirements and evolving industry standards. To compete successfully, we must continually design, develop, manufacture and sell new or enhanced products that provide increasingly higher levels of performance and reliability and meet our customers changing needs. However, we may not be successful in those efforts if, among other things, our products:

- are not cost effective;
- are not brought to market in a timely manner;
- are not in accordance with evolving industry standards;
- fail to meet market acceptance or customer requirements; or
- are ahead of the needs of their markets.

We are currently developing and marketing products based on the latest video compression standards, such as HEVC, which provides significantly greater compression efficiency, thereby making more bandwidth available to operators. At the same time, we continue to devote development resources to enhance the existing AVC/H.264 compression of our products, which many of our customers continue to require. There can be no assurance that these efforts will be successful in the near future, or at all, or that our competitors will not take significant market share in encoding or transcoding.

We continue to focus our development efforts on key product solutions in our Video and Cable Edge businesses. Our VOS solution is a software-based, cloud-enabled platform that unifies the entire media processing chain, from ingest to delivery. We have launched a number of VOS-based product solutions and services, including Electra XVM, VOS Software Cluster (formerly VOS Cloud) and VOS360, and continue to develop and expand the capabilities of our VOS software platform. In our Cable Edge business, we have launched and continue to develop our CableOS software-based CCAP systems.

Many of these products and initiatives are intended to integrate existing and new features and functions in response to shifts in customer demands in the relevant market, as well as to general technology trends (such as virtualized and cloud-based computing, and integrated QAM and CMTS functionality in software-based CCAP solutions) that we believe will significantly impact our industry. The success of these significant and costly development efforts will be predicated, for certain products and initiatives, on the timing of market adoption of the new standards on which the resulting products are based, and for other products, the timing of customer adoption of our products and solutions, as well as our ability to timely develop the features and capabilities of our products and solutions. If new standards or some of our new products are adopted later than we predict or not adopted at all, or if adoption occurs earlier than we are able to deliver the applicable products or functionality, we risk spending significant research and development time and dollars on products or features that may never achieve market acceptance or that miss the customer demand window and thus do not produce the revenue that a timely introduction would have likely produced.

If we fail to develop and market new and enhanced products on a timely basis, our operating results, financial condition and cash flows could be materially and adversely affected.

Our CCAP-based product initiatives expose us to certain technology transition risks that may adversely impact our operating results, financial condition and cash flows.

In the last few years, the cable industry has begun to develop and promulgate the CCAP architecture for next-generation cable edge solutions, which combines edge QAM and CMTS functions in a single system in order to combine resources for video and data delivery. We believe our CableOS software-based CCAP solution, supporting centralized, distributed Remote PHY or hybrid configurations, will significantly reduce cable headend costs and increase operational efficiency, and are an important step in cable operators' transition to all-IP networks. If we are unsuccessful in developing these capabilities in a timely manner, or are otherwise delayed in making such capabilities available to our customers, our business may be adversely impacted, particularly if our competitors develop and market fully compliant products before we do.

We believe CCAP-based solutions will, over time, replace and make obsolete current cable edge-QAM solutions, including our cable edge QAM products, as well as current CMTS solutions, which is a market our products have previously not addressed. If demand for our CCAP solutions is weaker than expected, or sales of our CCAP-based solutions do not adequately offset the continuing decline in demand we have experienced for our non-CCAP cable access products, our near and long-term operating results, financial condition and cash flows could be adversely impacted. Further, in September 2016 we granted Comcast a warrant (the "Warrant") to purchase shares of our common stock to further incentivize them to purchase our products and adopt our technologies, particularly our CableOS software-based CCAP solution. If Comcast does not adopt our CableOS solution, or does so more slowly than we anticipate, we may be unable to realize the anticipated benefits of our relationship with Comcast and our business and operating results, financial condition and cash flows could be materially and adversely affected. Moreover, if a new or competitive architecture for next-generation cable edge solutions is promulgated that renders our CCAP-based systems obsolete, our business may be adversely impacted.

The sales cycle for our CableOS solutions tends to be long. For cable operators, upgrading or expanding network infrastructure is complex and expensive, and investing in a CableOS solution is a significant strategic decision that may require considerable time to evaluate, test and qualify. Potential customers need to ensure our CableOS solution will interoperate with the various components of its existing network infrastructure, including third-party equipment, servers and software. In addition, since we are a relatively new entrant into the CMTS market, we need to demonstrate significant performance, functionality and/or cost advantages with our CableOS solutions that outweigh customer switching costs. If sales cycles are significantly longer than anticipated or we are otherwise unsuccessful in growing our CableOS sales, our operating results, financial condition and cash flows could be materially and adversely affected.

Our future growth depends on market acceptance of several broadband services, on the adoption of new broadband technologies, and on several other broadband industry trends.

Future demand for many of our products will depend significantly on the growing market acceptance of emerging broadband services, including digital video, VOD, Ultra HD, IP video services (particularly streaming to tablet computers, connected TVs and mobile devices) and very high-speed data services. The market demand for such emerging services is rapidly growing, with many custom or proprietary systems in use, which increases the challenge of delivering interoperable products intended to address the requirements of such services.

The effective delivery of these services will depend, in part, on a variety of new network architectures, standards and devices, such as:

- the adoption of cloud-native media processing architectures;
- the adoption of advanced video compression standards, such as next generation H.264 compression and HEVC;
- the CCAP architecture;
- fiber to the premises, or FTTP, networks designed to facilitate the delivery of video services by telcos;
- the greater use of protocols such as IP;
- the further adoption of bandwidth-optimization techniques, such as DOCSIS 3.0 and DOCSIS 3.1; and
- the introduction of new consumer devices, such as advanced set-top boxes, DVRs and network DVRs, connected TVs, tablet computers, and a variety of smart phone mobile devices.

If adoption of these emerging services and/or technologies is not as widespread or as rapid as we expect, or if we are unable to develop new products based on these technologies on a timely basis, our operating results, financial condition and cash flows could be materially and adversely affected.

Furthermore, other technological, industry and regulatory trends and requirements may affect the growth of our business. These trends and requirements include the following:

- convergence, whereby network operators bundle video, voice and data services to consumers, including mobile delivery options;
- the increasing availability of traditional broadcast video content and video-on-demand on the Internet;

- adoption of high-bandwidth technology, such as DOCSIS 3.x, next generation LTE and FTTP;
- the use of digital video by businesses, governments and educational institutions;
- efforts by regulators and governments in the U.S. and internationally to encourage the adoption of broadband and digital technologies, as well as to regulate broadband access and delivery;
- consumer interest in higher resolution video such as Ultra HD or retina-display technologies on mobile devices;
- the need to develop partnerships with other companies involved in video infrastructure workflow and broadband services;
- the continued adoption of the television viewing behaviors of consumers in developed economies by the growing middle class across emerging economies;
- the extent and nature of regulatory attitudes towards issues such as network neutrality, competition between operators, access by third parties to networks of other operators, local franchising requirements for telcos to offer video, and other new services, such as mobile video; and
- the outcome of disputes and negotiations between content owners and service providers regarding rights of service providers to store and distribute recorded broadcast content, which outcomes may drive adoption of one technology over another in some cases.

If we fail to recognize and respond to these trends, by timely developing products, features and services required by these trends, we are likely to lose revenue opportunities and our operating results, financial condition and cash flows could be materially and adversely affected.

We depend significantly on our international revenue and are subject to the risks associated with international operations, including those of our resellers, contract manufacturers and outsourcing partners, which may negatively affect our operating results.

Revenue derived from customers outside of the U.S. in the fiscal years ended December 31, 2017, 2016 and 2015 represented approximately 63%, 58% and 53% of our revenue, respectively. Although no assurance can be given with respect to international sales growth in any one or more regions, we expect that international revenue will likely continue to represent, from year to year, a majority, and potentially increasing, percentage of our annual revenue for the foreseeable future. A significant percentage of our revenue is generated from sales to resellers, value-added resellers (“VARs”) and systems integrators, particularly in emerging market countries. Furthermore, the majority of our employees are based in our international offices and locations, and most of our contract manufacturing occurs outside of the U.S. In addition, we outsource a portion of our research and development activities to certain third-party partners with development centers located in different countries, particularly Ukraine and India.

Our international operations, the international operations of our resellers, contract manufacturers and outsourcing partners, and our efforts to maintain and increase revenue in international markets are subject to a number of risks, which are generally greater with respect to emerging market countries, including the following:

- growth and stability of the economy in one or more international regions;
- fluctuations in currency exchange rates;
- changes in foreign government regulations and telecommunications standards;
- import and export license requirements, tariffs, taxes, economic sanctions, contractual limitations and other trade barriers;
- our significant reliance on resellers and others to purchase and resell our products and solutions, particularly in emerging market countries;
- availability of credit, particularly in emerging market countries;

- longer collection periods and greater difficulty in enforcing contracts and collecting accounts receivable, especially from smaller customers and resellers, particularly in emerging market countries;
- compliance with the U.S. Foreign Corrupt Practices Act (the “FCPA”), the U.K. Bribery Act and/or similar anti-corruption and anti-bribery laws, particularly in emerging market countries;
- the burden of complying with a wide variety of foreign laws, treaties and technical standards;
- fulfilling “country of origin” requirements for our products for certain customers;
- difficulty in staffing and managing foreign operations;
- business and operational disruptions or delays caused by political, social and economic instability and unrest, including risks related to terrorist activity, particularly in emerging market countries (e.g., recent significant civil, political and economic disturbances in Ukraine);
- changes in economic policies by foreign governments, including the imposition and potential continued expansion of economic sanctions by the U.S. and the European Union on the Russian Federation;
- any negative economic impacts resulting from the political environment in the U.S. or the U.K.’s referendum to exit the European Union; and
- business and economic disruptions and delays caused by outbreaks of disease, epidemics and potential pandemics.

We have certain international customers who are billed in their local currency, primarily the Euro, British pound and Japanese yen, which subjects us to foreign currency risk. In addition, a portion of our operating expenses relating to the cost of certain international employees, are denominated in foreign currencies, primarily the Israeli shekel, British pound, Euro, Singapore dollar, Chinese yuan and Indian rupee, although we do hedge against the Israeli shekel. Gains and losses on the conversion to U.S. dollars of accounts receivable, accounts payable and other monetary assets and liabilities arising from international operations may contribute to fluctuations in our operating results. Furthermore, payment cycles for international customers are typically longer than those for customers in the U.S. Unpredictable payment cycles could cause us to fail to meet or exceed the expectations of security analysts and investors for any given period.

Most of our international revenue is denominated in U.S. dollars, and fluctuations in currency exchange rates could cause our products to become relatively more expensive to customers in a particular country or region, leading to a reduction in revenue or profitability from sales in that country or region. The potential negative impact of a strong U.S. dollar on our business may be exacerbated by the significant devaluation of a number of foreign currencies. Also, if the U.S. dollar were to weaken against many foreign currencies, there can be no assurance that a weaker dollar would lead to growth in capital spending in foreign markets.

Our operations outside the U.S. also require us to comply with a number of U.S. and international regulations that prohibit improper payments or offers of payments to foreign governments and their officials and political parties for corrupt purposes. For example, our operations in countries outside the U.S. are subject to the FCPA and similar laws, including the U.K. Bribery Act. Our activities in certain emerging countries create the risk of unauthorized payments or offers of payments by one of our employees, consultants, sales agents or channel partners that could be in violation of various anti-corruption laws, even though these parties may not be under our control. Under the FCPA and U.K. Bribery Act, companies may be held liable for the corrupt actions taken by their directors, officers, employees, channel partners, sales agents, consultants, or other strategic or local partners or representatives. We have internal control policies and procedures with respect to FCPA compliance, have implemented FCPA training and compliance programs for our employees, and include in our agreements with resellers a requirement that those parties comply with the FCPA. However, we cannot provide assurances that our policies, procedures and programs will prevent violations of the FCPA or similar laws by our employees or agents, particularly in emerging market countries, and as we expand our international operations. Any such violation, even if prohibited by our policies, could result in criminal or civil sanctions against us.

The effect of one or more of these international risks could have a material and adverse effect on our business, financial condition, operating results and cash flows.

We purchase several key components, subassemblies and modules used in the manufacture or integration of our products from sole or limited sources, and we rely on contract manufacturers and other subcontractors.

Many components, subassemblies and modules necessary for the manufacture or integration of our products are obtained from a sole supplier or a limited group of suppliers. For example, we depend on two suppliers for certain video encoding chips which are incorporated into several products. Our reliance on sole or limited suppliers, particularly foreign suppliers, and our reliance on contractors for manufacturing and installation of our products, involves several risks, including a potential inability to obtain an adequate supply of required components, subassemblies or modules; reduced control over costs, quality and timely delivery of components, subassemblies or modules; supplier discontinuation of components, subassemblies or modules we require; and timely installation of products. In addition, in the U.S. the Trump administration has suggested imposing, and has begun to impose tariffs or other restrictions on foreign imports. If any such tariffs are imposed on products or components that we import, including those obtained from a sole supplier or a limited group of suppliers, we could experience reduced revenues or may have to raise our prices, either of which could have an adverse effect on our business, financial condition and operating results.

These risks could be heightened during a substantial economic slowdown, because our suppliers and subcontractors are more likely to experience adverse changes in their financial condition and operations during such a period. Further, these risks could materially and adversely affect our business if one of our sole sources, or a sole source of one of our suppliers or contract manufacturers, is adversely affected by a natural disaster. While we expend resources to qualify additional component sources, consolidation of suppliers and the small number of viable alternatives have limited the results of these efforts. Managing our supplier and contractor relationships is particularly difficult during time periods in which we introduce new products and during time periods in which demand for our products is increasing, especially if demand increases more quickly than we expect.

Plexus Services Corp., which manufactures our products at its facilities in Malaysia, currently serves as our primary contract manufacturer, and currently provides us with a majority, by dollar amount, of the products that we purchase from our contract manufacturers. Most of the products manufactured by our French and Israeli operations are outsourced to another third-party manufacturer in France and Israel, respectively. From time to time we assess our relationship with our contract manufacturers, and we do not generally maintain long-term agreements with any of our suppliers or contract manufacturers. Our agreement with Plexus has automatic annual renewals, unless prior notice is given by either party, and has been automatically renewed for a term expiring in October 2018.

Difficulties in managing relationships with any of our current contract manufacturers, particularly Plexus, that manufacture our products off-shore, or any of our suppliers of key components, subassemblies and modules used in our products, could impede our ability to meet our customers' requirements and adversely affect our operating results. An inability to obtain adequate and timely deliveries of our products or any materials used in our products, or the inability of any of our contract manufacturers to scale their production to meet demand, or any other circumstance that would require us to seek alternative sources of supply, could negatively affect our ability to ship our products on a timely basis, which could damage relationships with current and prospective customers and harm our business and materially and adversely affect our revenue and other operating results. Furthermore, if we fail to meet customers' supply expectations, our revenue would be adversely affected and we may lose sales opportunities, both short and long term, which could materially and adversely affect our business and our operating results, financial condition and cash flows. Increases, from time to time, in demand on our suppliers and subcontractors from our customers or from other parties have, on occasion, caused delays in the availability of certain components and products. In response, we may increase our inventories of certain components and products and expedite shipments of our products when necessary. These actions could increase our costs and could also increase our risk of holding obsolete or excess inventory, which, despite our use of a demand order fulfillment model, could materially and adversely affect our business, operating results, financial condition and cash flows.

The loss of one or more of our key customers, a failure to continue diversifying our customer base, or a decrease in the number of larger transactions could harm our business and our operating results.

Historically, a significant portion of our revenue has been derived from relatively few customers, due in part to the consolidation of our service provider and media customers. Sales to our top 10 customers in the fiscal years ended December 31, 2017, 2016 and 2015 accounted for approximately 24%, 28% and 32% of revenue, respectively. Although we have broadened our customer base by further penetrating new markets and expanding internationally, we expect to see continuing industry consolidation and customer concentration.

In the fiscal years ended December 31, 2017 and 2016, no single customer accounted for more than 10% of our net revenue. In the fiscal year ended December 31, 2015, revenue from Comcast accounted for approximately 12% of our net revenue. Further consolidation of our service provider and media customers could lead to additional revenue concentration for

us and the loss of any significant customer, or any material reduction in orders from any other significant customer, or our failure to qualify our new products with any significant customer could materially and adversely affect, either long term or in a particular quarter, our operating results, financial condition and cash flows. Further, if Comcast does not increase its adoption of our technologies or purchases of our products in connection with the Warrant we issued to them in September 2016, or does so more slowly than we anticipate, we may be unable to realize the anticipated benefits of the Warrant and our operating results, financial condition and cash flows could be materially and adversely effected.

In addition, we are involved in most quarters in one or more relatively large individual transactions. A decrease in the number of the relatively larger individual transactions in which we are involved in any quarter could materially and adversely affect our operating results for that quarter.

As a result of these and other factors, we may be unable to increase our revenues from some or all of the markets we address, or to do so profitably, and any failure to increase revenues and profits from these customers could materially and adversely affect our operating results, financial condition and cash flows.

We rely on resellers, value-added resellers and systems integrators for a significant portion of our revenue, and disruptions to, or our failure to develop and manage our relationships with these customers or the processes and procedures that support them could adversely affect our business.

We generate a significant percentage of our revenue through sales to resellers, VARs and systems integrators that assist us with fulfillment or installation obligations. We expect that these sales will continue to generate a significant percentage of our revenue in the future. Accordingly, our future success is highly dependent upon establishing and maintaining successful relationships with a variety of channel partners.

We generally have no long-term contracts or minimum purchase commitments with any of our reseller, VAR or system integrator customers, and our contracts with these parties do not prohibit them from purchasing or offering products or services that compete with ours. Our competitors may provide incentives to any of our reseller, VAR or systems integrator customers to favor their products or, in effect, to prevent or reduce sales of our products. Any of our reseller, VAR or systems integrator customers may independently choose not to purchase or offer our products. Many of our resellers, and some of our VARs and system integrators are small, are based in a variety of international locations, and may have relatively unsophisticated processes and limited financial resources to conduct their business. Any significant disruption of our sales to these customers, including as a result of the inability or unwillingness of these customers to continue purchasing our products, or their failure to properly manage their business with respect to the purchase of, and payment for, our products, or their ability to comply with our policies and procedures as well as applicable laws, could materially and adversely affect our business, operating results, financial condition and cash flows. In addition, our failure to continue to establish or maintain successful relationships with reseller, VAR and systems integrator customers could likewise materially and adversely affect our business, operating results, financial condition and cash flows.

We have made, and may continue to make, acquisitions, and any acquisition could disrupt our operations, cause dilution to our stockholders and materially and adversely affect our business, operating results, cash flows and financial condition.

As part of our business strategy, from time to time we have acquired, and we may continue to acquire, businesses, technologies, assets and product lines that we believe complement or expand our existing business. For example, on February 29, 2016, we announced the closing of our acquisition of TVN, which is headquartered in Rennes, France. Acquisitions involve numerous risks, including the following:

- unanticipated costs or delays associated with an acquisition;
- difficulties in the assimilation and integration of acquired operations, technologies and/or products;
- potential disruption of our business and the diversion of management's attention from the regular operations of the business during the acquisition process;
- the challenges of managing a larger and more geographically widespread operation and product portfolio after the closing of the acquisition;
- potential adverse effects on new and existing business relationships with suppliers, contract manufacturers, resellers, partners and customers;

- compliance with regulatory requirements, such as local employment regulations and organized labor in France;
- risks associated with entering markets in which we may have no or limited prior experience;
- the potential loss of key employees of acquired businesses and our own business as a result of integration;
- difficulties in bringing acquired products and businesses into compliance with applicable legal requirements in jurisdictions in which we operate and sell products;
- impact of known potential liabilities or unknown liabilities, including litigation and infringement claims, associated with companies we acquire;
- substantial charges for acquisition costs or for the amortization of certain purchased intangible assets, deferred stock compensation or similar items;
- substantial impairments to goodwill or intangible assets in the event that an acquisition proves to be less valuable than the price we paid for it;
- difficulties in establishing and maintaining uniform financial and other standards, controls, procedures and policies;
- delays in realizing, or failure to realize, the anticipated benefits of an acquisition; and
- the possibility that any acquisition may be viewed negatively by our customers or investors or the financial markets.

Competition within our industry for acquisitions of businesses, technologies, assets and product lines has been, and is likely to continue to be, intense. As such, even if we are able to identify an acquisition that we would like to consummate, we may not be able to complete the acquisition on commercially reasonable terms or because the target chooses to be acquired by another company. Furthermore, in the event that we are able to identify and consummate any future acquisitions, we may, in each of those acquisitions:

- issue equity securities which would dilute current stockholders' percentage ownership;
- incur substantial debt to finance the acquisition or assume substantial debt in the acquisition;
- incur significant acquisition-related expenses;
- assume substantial liabilities, contingent or otherwise; or
- expend significant cash.

These financing activities or expenditures could materially and adversely affect our operating results, cash flows and financial condition or the price of our common stock. Alternatively, due to difficulties in the capital or credit markets at the time, we may be unable to secure capital necessary to complete an acquisition on reasonable terms, or at all. Moreover, even if we were to obtain benefits from acquisitions in the form of increased revenue and earnings per share, there may be a delay between the time the expenses associated with an acquisition are incurred and the time we recognize such benefits.

In addition to the risks outlined above, if we are unable to successfully receive payment of any significant portion of TVN's existing French R&D tax credit receivables from the French tax authority as expected, or are unable to successfully apply for or otherwise obtain the financial benefit of new French R&D tax credits in future years, our ability to achieve the anticipated benefits of the acquisition as well as our business, operating results and financial condition could be adversely affected.

As of December 31, 2017, we had approximately \$243 million of goodwill recorded on our balance sheet associated with prior acquisitions. In the event we determine that our goodwill is impaired, we would be required to write down all or a portion of such goodwill, which could result in a material non-cash charge to our results of operations in the period in which such write-down occurs.

If we are unable to successfully address one or more of these risks, our business, operating results, financial condition and cash flows could be materially and adversely affected.

We may not be able to effectively manage our operations.

In recent years, we have expanded our international operations significantly. For example, upon the closing of our acquisition of TVN on February 29, 2016, we added 438 employees, most of whom are based in France.

As of December 31, 2017, we had 809 employees in our international operations, representing approximately 65% of our worldwide workforce. Our ability to manage our business effectively in the future, including with respect to any future growth, our operation as both a hardware and increasingly software-centric business, the integration of any acquisition efforts such as our recent acquisition of TVN, and the breadth of our international operations, will require us to train, motivate and manage our employees successfully, to attract and integrate new employees into our overall operations, to retain key employees and to continue to improve and evolve our operational, financial and management systems. There can be no assurance that we will be successful in any of these efforts, and our failure to effectively manage our operations could have a material and adverse effect on our business, operating results, cash flows and financial condition.

We face risks associated with having outsourced engineering resources located in Ukraine.

We outsource a portion of our research and development activities for both our Video and Cable Edge business segments to a third-party partner with engineering resources located in Ukraine. Political, social and economic instability and unrest or violence in Ukraine, including the ongoing conflict with Russian-backed separatists or conflict with the Russian Federation directly, could cause disruptions to the business and operations of our outsourcing partner, which could slow or delay the development work our partner is undertaking for us. Instability, unrest or conflict could limit or prevent our employees from traveling to, from, or within Ukraine to direct and coordinate our outsourced engineering teams, or cause us to shift all or portions of the development work occurring in Ukraine to other locations or countries. The resulting delays could negatively impact our product development efforts, operating results and our business.

In order to manage our growth, we must be successful in addressing management succession issues and attracting and retaining qualified personnel.

Our future success will depend, to a significant extent, on the ability of our management to operate effectively, both individually and as a group. We must successfully manage transition and replacement issues that may result from the departure or retirement of members of our executive management. We cannot provide assurances that changes of management personnel in the future would not cause disruption to operations or customer relationships or a decline in our operating results.

We are also dependent on our ability to retain and motivate our existing highly qualified personnel, in addition to attracting new highly qualified personnel. Competition for qualified management, technical and other personnel is often intense, particularly in Silicon Valley, Israel and Hong Kong where we have significant research and development activities, and we may not be successful in attracting and retaining such personnel. Competitors and others have in the past attempted, and are likely in the future to attempt, to recruit our employees. While our employees are required to sign standard agreements concerning confidentiality, non-solicitation and ownership of inventions, we generally do not have non-competition agreements with our personnel. The loss of the services of any of our key personnel, the inability to attract or retain highly qualified personnel in the future or delays in hiring such personnel, particularly senior management and engineers and other technical personnel, could negatively affect our business and operating results. Furthermore, a certain portion of our personnel in the U.S. is comprised of foreign nationals whose ability to work for us depends on obtaining the necessary visas. Our ability to hire and retain foreign nationals in the U.S., and their ability to remain and work in the U.S., is affected by various laws and regulations, including limitations on the availability of visas. Changes in U.S. laws or regulations affecting the availability of visas may adversely affect our ability to hire or retain key personnel and as a result may impair our operations.

We face risks associated with having facilities and employees located in Israel.

As of December 31, 2017, we maintained facilities in Israel with a total of 164 employees, or approximately 13% of our worldwide workforce. Our employees in Israel engage in a number of activities, for both our Video and Cable Edge business segments, including research and development, product development, and supply chain management for certain product lines and sales activities.

As such, we are directly affected by the political, economic and military conditions affecting Israel. Any significant conflict involving Israel could have a direct effect on our business or that of our Israeli contract manufacturers, in the form of physical damage or injury, restrictions from traveling or reluctance to travel to from or within Israel by our Israeli and other employees or those of our subcontractors, or the loss of Israeli employees to active military duty. Most of our employees in

Israel are currently obligated to perform annual reserve duty in the Israel Defense Forces, and approximately 9% of those employees were called for active military duty in 2017. In the event that more of our employees are called to active duty, certain of our research and development activities may be significantly delayed and adversely affected. Further, the interruption or curtailment of trade between Israel and its trading partners, as a result of terrorist attacks or hostilities, conflicts between Israel and any other Middle Eastern country or organization, or any other cause, could significantly harm our business. Additionally, current or future tensions or conflicts in the Middle East could materially and adversely affect our business, operating results, financial condition and cash flows.

Our operating results are likely to fluctuate significantly and, as a result, may fail to meet or exceed the expectations of securities analysts or investors, causing our stock price to decline.

Our operating results have fluctuated in the past and are likely to continue to fluctuate in the future, on an annual and a quarterly basis, as a result of several factors, many of which are outside of our control. Some of the factors that may cause these fluctuations include:

- the level and timing of capital spending of our customers in the U.S., Europe and in other markets;
- economic and financial conditions specific to each of the cable, satellite and telco, and broadcast and media industries, as well as general economic and financial market conditions, including any stemming from an unstable political environment in the United States or abroad as well as those resulting from regulatory, trade or tax policy changes from the Tax Cuts and Jobs Act that was enacted in December 2017 (the “TCJA”);
- changes in market acceptance of and demand for our products or our customers’ services or products;
- the timing and amount of orders, especially from large individual transactions and transactions with our significant customers;
- the mix of our products sold and the effect it has on gross margins;
- the timing of revenue recognition, including revenue recognition on sales arrangements and from transactions with significant service and support components, which may span several quarters;
- our transition to a software-as-a-service subscription model for our Video business, which may cause near-term declines in revenue;
- the timing of completion of our customers’ projects;
- the length of each customer product upgrade cycle and the volume of purchases during the cycle;
- competitive market conditions, including pricing actions by our competitors;
- the level and mix of our domestic and international revenue;
- new product introductions by our competitors or by us;
- uncertainty in both the U.K. and the European Union due to the U.K.’s referendum to exit the European Union, which could adversely affect our results, financial condition and prospects;
- changes in domestic and international regulatory environments affecting our business;
- the evaluation of new services, new standards and system architectures by our customers;
- the cost and timely availability to us of components, subassemblies and modules;
- the mix of our customer base, by industry and size, and sales channels;
- changes in our operating and extraordinary expenses;
- the timing of acquisitions and dispositions by us and the financial impact of such transactions;

- impairment of our goodwill and intangibles;
- the impact of litigation, such as related litigation expenses and settlement costs;
- write-downs of inventory and investments;
- changes in our effective federal tax rate, including as a result of changes in our valuation allowance against our deferred tax assets, and changes in our effective state tax rates, including as a result of apportionment;
- changes to tax rules related to the deferral of foreign earnings and compliance with foreign tax rules;
- the impact of applicable accounting guidance on accounting for uncertainty in income taxes that requires us to establish reserves for uncertain tax positions and accrue potential tax penalties and interest; and
- the impact of applicable accounting guidance on business combinations that requires us to record charges for certain acquisition related costs and expenses and generally to expense restructuring costs associated with a business combination subsequent to the acquisition date.

The timing of deployment of our products by our customers can be subject to a number of other risks, including the availability of skilled engineering and technical personnel, the availability of third-party equipment and services, our customers' ability to negotiate and enter into rights agreements with video content owners that provide our customers with the right to deliver certain video content, and our customers' need for local franchise and licensing approvals.

We often recognize a substantial portion of our quarterly revenue in the last month of the quarter. We establish our expenditure levels for product development and other operating expenses based on projected revenue levels for a specified period, and expenses are relatively fixed in the short term. Accordingly, even small variations in the timing of revenue, particularly from relatively large individual transactions, can cause significant fluctuations in operating results in a particular quarter.

As a result of these factors and other factors, our operating results in one or more future periods may fail to meet or exceed the expectations of securities analysts or investors. In that event, the trading price of our common stock would likely decline.

Fluctuations in our future effective tax rates could affect our future operating results, financial condition and cash flows.

We are required to periodically review our deferred tax assets and determine whether, based on available evidence, a valuation allowance is necessary. The realization of our deferred tax assets, which are predominantly in the U.S., is dependent upon the generation of sufficient U.S. and foreign taxable income in the future to offset these assets. Based on our evaluation, a history of operating losses in recent years has led to uncertainty with respect to our ability to realize certain of our net deferred tax assets, and as a result we recorded a net increase in valuation allowance of \$9.0 million and \$18.3 million in 2017 and 2016, respectively, against our U.S. net deferred tax assets. The increase in valuation allowance in 2017 and 2016 were offset partially by the release of \$5.8 million and \$8.4 million, respectively. The release of valuation allowance were associated with our foreign subsidiaries and a one-time benefit in 2017 of \$2.6 million relating to the refund of alternative minimum tax credit carryforwards related to the TCJA.

The calculation of tax liabilities involves dealing with uncertainties in the application of complex global tax regulations. We recognize potential liabilities for anticipated tax audit issues in the U.S. and other tax jurisdictions based on our estimate of whether, and the extent to which, additional taxes will be due. In the event we determine that it is appropriate to create a reserve or increase an existing reserve for any such potential liabilities, the amount of the additional reserve is charged as an expense in the period in which it is determined. If payment of these amounts ultimately proves to be unnecessary, the reversal of the liabilities would result in tax benefits being recognized in the period when we determine the liabilities are no longer necessary. If the estimate of tax liabilities proves to be less than the ultimate tax assessment for the applicable period, a further charge to expense in the period such short fall is determined would result. Either such charge to expense could have a material and adverse effect on our operating results for the applicable period.

We anticipate that, due to our current international tax structure, our consolidated pre-tax income will continue to be subject to foreign tax at relatively lower tax rates when compared to the U.S. federal statutory tax rate and, as a consequence, our effective income tax rate is expected to be lower than the U.S. federal statutory rate.

Our future effective income tax rates could be adversely affected if tax authorities challenge our international tax structure or if the relative mix of U.S. and international income changes for any reason. Accordingly, there can be no assurance that our income tax rate will be less than the U.S. federal statutory rate in future periods.

On December 22, 2017, the U.S. Congress passed and the President signed into law the TCJA, which contains many significant changes to the U.S. tax laws. The consequences of these changes, including whether and how state, local and foreign jurisdictions will react to such changes, have not yet been determined. Changes in corporate tax rates, the realizability of the net deferred tax assets relating to our U.S. operations, the taxation of foreign earnings, and the deductibility of expenses contained in the TJCA or other tax reform legislation could have a material impact on the value of our deferred tax assets, could result in significant one-time charges in the current or future taxable years, and could increase our future U.S. tax expense. Furthermore, changes to the taxation of undistributed foreign earnings could change our future intentions regarding reinvestment of such earnings. The foregoing items could have an adverse effect on our operating results, cash flow, or financial condition.

We or our customers may face intellectual property infringement claims from third parties.

Our industry is characterized by the existence of a large number of patents and frequent claims and related litigation regarding patent and other intellectual property rights. In particular, leading companies in the telecommunications industry have extensive patent portfolios. Also, patent infringement claims and litigation by entities that purchase or control patents, but do not produce goods or services covered by the claims of such patents (so-called “non-practicing entities” or “NPEs”), have increased rapidly over the last decade or so. From time to time, third parties, including NPEs, have asserted, and may assert in the future, patent, copyright, trademark and other intellectual property rights against us or our customers. Our suppliers and their customers, including us, may have similar claims asserted against them. A number of third parties, including companies with greater financial and other resources than us, have asserted patent rights to technologies that are important to us.

Any intellectual property litigation, regardless of its outcome, could result in substantial expense and significant diversion of the efforts of our management and technical personnel. An adverse determination in any such proceeding could subject us to significant liabilities and temporary or permanent injunctions and require us to seek licenses from third parties or pay royalties that may be substantial. Furthermore, necessary licenses may not be available on terms satisfactory to us, or at all. An unfavorable outcome on any such litigation matter could require that we pay substantial damages, could require that we pay ongoing royalty payments, or could prohibit us from selling certain of our products. Any such outcome could have a material and adverse effect on our business, operating results, financial condition and cash flows.

Our suppliers and customers may have intellectual property claims relating to our products asserted against them. We have agreed to indemnify some of our suppliers and most of our customers for patent infringement relating to our products. The scope of this indemnity varies, but, in some instances, includes indemnification for damages and expenses (including reasonable attorney’s fees) incurred by the supplier or customer in connection with such claims. If a supplier or a customer seeks to enforce a claim for indemnification against us, we could incur significant costs defending such claim, the underlying claim or both. An adverse determination in either such proceeding could subject us to significant liabilities and have a material and adverse effect on our operating results, cash flows and financial condition.

We may be the subject of litigation which, if adversely determined, could harm our business and operating results.

We may be subject to claims arising in the normal course of business. The costs of defending any litigation, whether in cash expenses or in management time, could harm our business and materially and adversely affect our operating results and cash flows. An unfavorable outcome on any litigation matter could require that we pay substantial damages, or, in connection with any intellectual property infringement claims, could require that we pay ongoing royalty payments or prohibit us from selling certain of our products. In addition, we may decide to settle any litigation, which could cause us to incur significant settlement costs. A settlement or an unfavorable outcome on any litigation matter could have a material and adverse effect on our business, operating results, financial condition and cash flows.

We may sell one or more of our product lines, from time to time, as a result of our evaluation of our products and markets, and any such divestiture could adversely affect our continuing business and our expenses, revenues, results of operation, cash flows and financial position.

We periodically evaluate our various product lines and may, as a result, consider the divestiture of one or more of those product lines. We have sold product lines in the past, and any prior or future divestiture could adversely affect our continuing business and expenses, revenues, results of operations, cash flows and financial position.

Divestitures of product lines have inherent risks, including the expense of selling the product line, the possibility that any anticipated sale will not occur, delays in closing any sale, the risk of lower-than-expected proceeds from the sale of the divested business, unexpected costs associated with the separation of the business to be sold from the seller's information technology and other operating systems, and potential post-closing claims for indemnification or breach of transition services obligations of the seller. Expected cost savings, which are offset by revenue losses from divested businesses, may also be difficult to achieve or maximize due to the seller's fixed cost structure, and a seller may experience varying success in reducing fixed costs or transferring liabilities previously associated with the divested business.

We could be negatively affected as a result of a future proxy contest and the actions of activist stockholders.

If a proxy contest with respect to election of our directors is initiated in the future, or if other activist stockholder activities occur, our business could be adversely affected because:

- responding to a proxy contest and other actions by activist stockholders can be costly and time-consuming, disrupting our operations and diverting the attention of management and our employees;
- perceived uncertainties as to our future direction caused by activist activities may result in the loss of potential business opportunities, and may make it more difficult to attract and retain qualified personnel and business partners; and
- if individuals are elected to our Board of Directors (the "Board") with a specific agenda, it may adversely affect our ability to effectively and timely implement our strategic plans.

Our failure to adequately protect our proprietary rights and data may adversely affect us.

At December 31, 2017, we held 74 issued U.S. patents and 46 issued foreign patents, and had 94 patent applications pending. Although we attempt to protect our intellectual property rights through patents, trademarks, copyrights, licensing arrangements, maintaining certain technology as trade secrets and other measures, we can give no assurances that any patent, trademark, copyright or other intellectual property rights owned by us will not be invalidated, circumvented or challenged, that such intellectual property rights will provide competitive advantages to us, or that any of our pending or future patent applications will be issued with the scope of the claims sought by us, if at all. We can give no assurances that others will not develop technologies that are similar or superior to our technologies, duplicate our technologies or design around the patents that we own. In addition, effective patent, copyright and trade secret protection may be unavailable or limited in certain foreign countries in which we do business or may do business in the future.

We enter into confidentiality or license agreements with our employees, consultants, and vendors and our customers, as needed, and generally limit access to, and distribution of, our proprietary information. Nevertheless, we cannot provide assurances that the steps taken by us will prevent misappropriation of our technology. In addition, we have taken in the past, and may take in the future, legal action to enforce our patents and other intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others, or to defend against claims of infringement or invalidity. Such litigation could result in substantial costs and diversion of management time and other resources, and could materially and adversely affect our business, operating results, financial condition and cash flows.

Recently reported hacking attacks on government and commercial computer systems, particularly attacks sponsored by foreign governments or enterprises, raise the risks that such an attack may compromise, in a material respect, one or more of our computer systems and permit hackers access to our proprietary information and data. While we have invested in and continue to update our network security and cybersecurity infrastructure and systems, if such an attack does, in fact, allow access to or theft of our proprietary information or data, our business, operating results, financial condition and cash flows could be materially and adversely affected.

Our products include third-party technology and intellectual property, and our inability to acquire new technologies or use third-party technology in the future could harm our business.

In order to successfully develop and market certain of our planned products, we may be required to enter into technology development or licensing agreements with third parties. Although companies with technology useful to us are often willing to enter into technology development or licensing agreements with respect to such technology, we cannot provide assurances that such agreements may be negotiated on commercially reasonable terms, or at all. The failure to enter, or a delay in entering, into such technology development or licensing agreements, when necessary or desirable, could limit our ability to develop and market new products and could materially and adversely affect our business.

We incorporate certain third-party technologies, including software programs, into our products, and, as noted, intend to utilize additional third-party technologies in the future. In addition, the technologies that we license may not operate properly or as specified, and we may not be able to secure alternatives in a timely manner, either of which could harm our business. We could face delays in product releases until alternative technology can be identified, licensed or developed, and integrated into our products, if we are able to do so at all. These delays, or a failure to secure or develop adequate technology, could materially and adversely affect our business, operating results, financial condition and cash flows.

Our use of open source software in some of our products may expose us to certain risks.

Some of our products contain software modules licensed for use from third-party authors under open source licenses. Use and distribution of open source software may entail greater risks than use of third-party commercial software, as open source licensors generally do not provide warranties or other contractual protections regarding infringement claims or the quality of the code. Some open source licenses contain requirements that we make available source code for modifications or derivative works we create based upon the type of open source software we use. If we combine our proprietary software with open source software in a certain manner, we could, under certain of the open source licenses, be required to release the source code of our proprietary software to the public. This could allow our competitors to create similar products with lower development effort and in less time and ultimately could result in a loss of product sales for us.

Although we monitor our use of open source closely, it is possible our past, present or future use of open source has triggered or may trigger the foregoing requirements. Furthermore, the terms of many open source licenses have not been interpreted by U.S. courts, and there is a risk that such licenses could be construed in a manner that could impose unanticipated conditions or restrictions on our ability to commercialize our products. In such event, we could be required to seek licenses from third parties in order to continue offering our products, to re-engineer our products or to discontinue the sale of our products in the event re-engineering cannot be accomplished on a timely basis, any of which could materially and adversely affect our operating results, financial condition and cash flows.

We are subject to import and export control and trade and economic sanction laws and regulations that could subject us to liability or impair our ability to compete in international markets.

Our products are subject to U.S. export control laws, and may be exported outside the U.S. only with the required export license or through an export license exception, in most cases because we incorporate encryption technology into certain of our products. We are also subject to U.S. trade and economic sanction regulations which include prohibitions on the sale or supply of certain products and services to U.S. embargoed or sanctioned countries, governments, persons and entities. In addition, various countries regulate the import of certain technology and have enacted laws that could limit our ability to distribute our products, or could limit our customers' ability to implement our products, in those countries. Although we take precautions and have processes in place to prevent our products and services from being provided in violation of such laws, our products may have been in the past, and could in the future be, provided inadvertently in violation of such laws, despite the precautions we take. If we fail to comply with these laws, we and certain of our employees could be subject to civil or criminal penalties, including the possible loss of export privileges, monetary penalties, and, in extreme cases, imprisonment of responsible employees for knowing and willful violations of these laws. Additionally, our business and operating results be adversely affected through penalties, reputational harm, loss of access to certain markets, or otherwise.

In addition, we may be subject to customs duties that could have a significant adverse impact on our operating results or, if we are able to pass on the related costs in any particular situation, would increase the cost of the related product to our customers. As a result, the future imposition of significant increases in the level of customs duties or the creation of import quotas on our products in Europe or in other jurisdictions, or any of the limitations on international sales described above, could have a material adverse effect on our business, operating results, financial condition and cash flows. Further, some of our customers in Europe have been, or are being, audited by local governmental authorities regarding the tariff classifications used for importation of our products. Import duties and tariffs vary by country and a different tariff classification for any of our products may result in higher duties or tariffs, which could have an adverse impact on our operating results and potentially increase the cost of the related products to our customers.

We may need additional capital in the future and may not be able to secure adequate funds at all or on terms acceptable to us.

We engage in the design, development, and manufacture and sale of a variety of video and cable access products and system solutions, which has required, and will continue to require, significant research and development expenditures.

We believe that our existing cash of approximately \$57 million at December 31, 2017 will satisfy our cash requirements for at least the next 12 months. However, we may need to raise additional funds to take advantage of presently unanticipated strategic opportunities, satisfy our other cash requirements from time to time, or strengthen our financial position. Our ability to raise funds may be adversely affected by a number of factors, including factors beyond our control, such as weakness in the economic conditions in markets in which we sell our products and continued uncertainty in financial, capital and credit markets. There can be no assurance that equity or debt financing will be available to us on reasonable terms, if at all, when and if it is needed.

We may raise additional financing through public or private equity offerings, debt financings, or corporate partnership or licensing arrangements. To the extent we raise additional capital by issuing equity securities or convertible debt, our stockholders may experience dilution. To the extent that we raise additional funds through collaboration and licensing arrangements, it may be necessary to relinquish some rights to our technologies or products, or grant licenses on terms that are not favorable to us. To the extent we raise capital through debt financing arrangements, we may be required to pledge assets or enter into covenants that could restrict our operations or our ability to incur further indebtedness and the interest on such debt may adversely affect our operating results.

If adequate capital is not available, or is not available on reasonable terms, when needed, we may not be able to take advantage of acquisition or other market opportunities, to timely develop new products, or to otherwise respond to competitive pressures.

Our operating results could be adversely affected by natural disasters affecting us or impacting our third-party manufacturers, suppliers, resellers or customers.

Our corporate headquarters is located in California, which is prone to earthquakes. We have employees, consultants and contractors located in regions and countries around the world. In the event that any of our business, sales or research and development centers or offices in the U.S. or internationally are adversely affected by an earthquake or by any other natural disaster, we may sustain damage to our operations and properties, which could cause a sustained interruption or loss of affected operations, and cause us to suffer significant financial losses.

We rely on third-party contract manufacturers for the production of our products. Any significant disruption in the business or operations of such manufacturers or of their or our suppliers could adversely impact our business. Our principal contract manufacturers and several of their and our suppliers and our resellers have operations in locations that are subject to natural disasters, such as severe weather, tsunamis, floods and earthquakes, which could disrupt their operations and, in turn, our operations.

In addition, if there is a natural disaster in any of the locations in which our significant customers are located, we face the risk that our customers may incur losses or sustained business interruption, or both, which may materially impair their ability to continue their purchase of products from us. Accordingly, natural disaster in one of the geographies in which we, or our third-party manufacturers, their or our suppliers or our customers, operate could have a material and adverse effect on our business, operating results, cash flows and financial condition.

Our business and industry are subject to various laws and regulations that could adversely affect our business, operating results, cash flows and financial condition.

Our business and industry are regulated under various federal, state, local and international laws. For example, we are subject to environmental regulations such as the European Union's Waste Electrical and Electronic Equipment (WEEE) and Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) directives and similar legislation enacted in other jurisdictions worldwide. Our failure to comply with these laws could result in our being directly or indirectly liable for costs, fines or penalties and third-party claims, and could jeopardize our ability to conduct business in such regions and countries. We expect that our operations will be affected by other new environmental laws and regulations on an ongoing basis. Although we cannot predict the ultimate impact of any such new laws and regulations, they would likely result in additional costs, and could require that we redesign or change how we manufacture our products, any of which could have a material and adverse effect on our operating results, financial condition and cash flows.

We are subject to the Sarbanes-Oxley Act of 2002 which, among other things, requires an annual review and evaluation of our internal control over financial reporting. If we conclude in future periods that our internal control over financial reporting is not effective or if our independent registered public accounting firm is unable to provide an unqualified attestation as of future year-ends, we may incur substantial additional costs in an effort to correct such problems, and investors may lose confidence in

our financial statements, and our stock price may decrease in the short term, until we correct such problems, and perhaps in the long term, as well.

We are subject to requirements under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 that require us to conduct research, disclose, and report whether or not our products contain certain conflict minerals sourced from the Democratic Republic of Congo or its surrounding countries. The implementation of these requirements could adversely affect the sourcing, availability, and pricing of the materials used in the manufacture of components used in our products. In addition, we may incur certain additional costs to comply with the disclosure requirements, including costs related to conducting diligence procedures to determine the sources of conflict minerals that may be used or necessary to the production of our products and, if applicable, potential changes to products, processes or sources of supply as a consequence of such verification activities. It is also possible that we may face reputational harm if we determine that certain of our products contain minerals not determined to be conflict-free and/or we are unable to alter our products, processes or sources of supply to avoid such materials.

Changes in telecommunications legislation and regulations in the U.S. and other countries could affect our sales and the revenue we are able to derive from our products. In particular, on December 14, 2017, the U.S. Federal Communications Commission (FCC) voted to repeal the “net neutrality” rules and return to a “light-touch” regulatory framework. However, the repeal has not yet taken effect and a number of parties have already stated their intent to appeal this order; thus, the future impact of such repeal and any challenge thereto remains uncertain. The rules were designed to ensure that all online content is treated the same by internet service providers and other companies that provide broadband services. Should the repeal of net neutrality rules take effect or regulations dealing with access by competitors to the networks of incumbent operators could slow or stop infrastructure and services investments or expansion by service providers. Increased regulation of our customers’ pricing or service offerings could limit their investments and, consequently, revenue from our products. The impact of new or revised legislation or regulations could have a material adverse effect on our business, operating results, financial condition and cash flows.

Some anti-takeover provisions contained in our certificate of incorporation and bylaws, as well as provisions of Delaware law, could impair a takeover attempt.

We have provisions in our certificate of incorporation and bylaws that could have the effect of rendering more difficult or discouraging an acquisition deemed undesirable by our Board. These include provisions:

- authorizing blank check preferred stock, which could be issued with voting, liquidation, dividend and other rights superior to our common stock;
- limiting the liability of, and providing indemnification to, our directors and officers;
- limiting the ability of our stockholders to call, and bring business before, special meetings;
- requiring advance notice of stockholder proposals for business to be conducted at meetings of our stockholders and for nominations of candidates for election to our Board;
- controlling the procedures for conducting and scheduling of Board and stockholder meetings; and
- providing the Board with the express power to postpone previously scheduled annual meetings and to cancel previously scheduled special meetings.

These provisions could delay hostile takeovers, changes in control of the Company or changes in our management. As a Delaware corporation, we are also subject to provisions of Delaware law, including Section 203 of the Delaware General Corporation law, which prevents some stockholders holding more than 15% of our outstanding common stock from engaging in certain business combinations without approval of the holders of substantially all of our outstanding common stock. Any provision of our certificate of incorporation or bylaws or Delaware law that has the effect of delaying or deterring a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock, and could also affect the price that some investors are willing to pay for our common stock.

The nature of our business requires the application of complex revenue and expense recognition rules and the current legislative and regulatory environment affecting generally accepted accounting principles is uncertain. Significant changes in current principles could affect our financial statements going forward and changes in financial accounting standards or practices may cause adverse, unexpected financial reporting fluctuations and harm our operating results.

The accounting rules and regulations that we must comply with are complex and subject to interpretation by the Financial Accounting Standards Board (the “FASB”), the SEC and various bodies formed to promulgate and interpret appropriate accounting principles. Recent actions and public comments from the FASB and the SEC have focused on the integrity of financial reporting and internal controls. In addition, many companies’ accounting policies are being subject to heightened scrutiny by regulators and the public. Further, the accounting rules and regulations are continually changing in ways that could materially impact our financial statements. For example, in May 2014, the FASB issued Accounting Standards Update (“ASU”) No. 2014-09, *Revenue from Contracts with Customers* (“Topic 606”), as amended, which will supersede nearly all existing revenue recognition guidance. The effective date of the new revenue standard is our first quarter of 2018. The new standard permits adoption either by using (i) a full retrospective approach for all periods presented in the period of adoption or (ii) a modified retrospective approach with the cumulative effect of initially applying the new standard recognized at the date of initial application and providing certain additional disclosures. We plan to adopt using the modified retrospective approach and we currently believe there will be significant impacts to the timing of recognition of software licenses with undelivered features and professional services revenue related to service contracts with acceptance terms, which could have a significant impact to our financial results.

The conditional conversion feature of our convertible senior notes, if triggered, may adversely affect our financial condition and operating results.

In December 2015, we issued \$128.25 million aggregate principal amount of 4.00% convertible senior notes due 2020 (the “Notes”) through a private placement with a financial institution. The Notes bear interest at 4.00% per annum, which is payable semiannually in arrears on June 1 and December 1 of each year, commencing June 1, 2016. In the event the conditional conversion feature of the Notes is triggered, holders of the Notes will be entitled to convert the Notes at any time during specified periods at their option. If one or more holders elect to convert their Notes, unless we elect to satisfy our conversion obligation by delivering solely shares of our common stock (other than paying cash in lieu of delivering any fractional share), we would be required to settle a portion or all of our conversion obligation through the payment of cash, which could adversely affect our liquidity. In addition, even if holders do not elect to convert their Notes, we could be required under applicable accounting rules to reclassify all or a portion of the outstanding principal of the Notes as a current rather than long-term liability, which would result in a material reduction of our net working capital.

The accounting method for convertible debt securities that may be settled in cash, such as the Notes, could have a material effect on our reported financial results.

Under Accounting Standards Codification 470-20, Debt with Conversion and Other Options (ASC 470-20) an entity must separately account for the liability and equity components of the convertible debt instruments (such as the Notes) that may be settled entirely or partially in cash upon conversion in a manner that reflects the issuer’s economic interest cost. The effect of ASC 470-20 on the accounting for the Notes is that the equity component is required to be included in the additional paid-in capital section of stockholders’ equity on our consolidated balance sheet, and the value of the equity component would be treated as debt discount for purposes of accounting for the debt component of the Notes. As a result, we will be required to record a greater amount of non-cash interest expense in current and future periods presented as a result of the amortization of the discounted carrying value of the Notes to their face amount over the term of the Notes. We will report lower net income in our financial results because ASC 470-20 will require interest to include both the current period’s amortization of the debt discount and the instrument’s non-convertible interest rate, which could adversely affect our reported or future financial results, the trading price of our common stock and the trading price of the Notes.

In addition, under certain circumstances, convertible debt instruments (such as the Notes) that may be settled entirely or partly in cash are currently accounted for utilizing the treasury stock method, the effect of which is that the shares issuable upon conversion of the Notes are not included in the calculation of diluted earnings per share except to the extent that the conversion value of the Notes exceeds their principal amount. Under the treasury stock method, for diluted earnings per share purposes, the transaction is accounted for as if the number of shares of common stock that would be necessary to settle such excess, if we elected to settle such excess in shares, are issued. We cannot be sure that the accounting standards in the future will continue to permit the use of the treasury stock method or circumstances would not change such that we would no longer be permitted to use the treasury stock method. If we are unable to use the treasury stock method in accounting for the shares issuable upon conversion of the Notes, then our diluted earnings per share would be adversely affected.

Our common stock price, and therefore the price of our Notes, may be extremely volatile, and the value of an investment in our stock may decline.

Our common stock price has been highly volatile. We expect that this volatility will continue in the future due to factors such as:

- general market and economic conditions;
- actual or anticipated variations in operating results;
- increases or decreases in the general stock market or to the stock prices of technology companies;
- announcements of technological innovations, new products or new services by us or by our competitors or customers;
- changes in financial estimates or recommendations by stock market analysts regarding us or our competitors;
- announcements by us or our competitors of significant acquisitions, dispositions, strategic partnerships, joint ventures or capital commitments;
- announcements by our customers regarding end user market conditions and the status of existing and future infrastructure network deployments;
- additions or departures of key personnel; and
- future equity or debt offerings or our announcements of these offerings.

In addition, in recent years, the stock market in general, and The NASDAQ Stock Market and the securities of technology companies in particular, have experienced extreme price and volume fluctuations. These fluctuations have often been unrelated or disproportionate to the operating performance of individual companies. These broad market fluctuations have in the past, and may in the future, materially and adversely affect our stock price, regardless of our operating results. In these circumstances, investors may be unable to sell their shares of our common stock at or above their purchase price over the short term, or at all.

Our stock price may decline if additional shares are sold in the market or if analysts drop coverage of or downgrade our stock.

Future sales of substantial amounts of shares of our common stock by our existing stockholders in the public market, or the perception that these sales could occur, may cause the market price of our common stock to decline. In addition, we issue additional shares upon exercise of stock options, including under our Employee Stock Purchase Plan (“ESPP”), and in connection with grants of restricted stock units (“RSUs”) on an ongoing basis. To the extent we do not elect to pay solely cash upon conversion of our Notes, we will also be required to issue additional shares of common stock upon conversion. Increased sales of our common stock in the market after exercise of outstanding stock options or grants of restricted stock units could exert downward pressure on our stock price. These sales also might make it more difficult for us to sell equity or equity-related securities in the future at a time and price we deem appropriate.

The trading market for our common stock relies in part on the availability of research and reports that third-party industry or securities analysts publish about us. If one or more of the analysts who do cover us downgrade our stock, our stock price may decline. If one or more of these analysts cease coverage of us, we could lose visibility in the market, which in turn could cause the liquidity of our stock and our stock price to decline.

Available Information

Harmonic makes available free of charge, on the Harmonic web site, the Company’s Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K (via link to the SEC website), and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after Harmonic files such material with, or furnishes such material to, the Securities and Exchange Commission. The address of the Harmonic web site is <http://www.harmonicinc.com>. Except as expressly set forth in this Form 10-K, the contents of our web site are not incorporated into, or otherwise to be regarded as part of, this report.

Item 1B. UNRESOLVED STAFF COMMENTS

None.

Item 2. *PROPERTIES*

All of our facilities are leased, including our principal operations and corporate headquarters in San Jose, California. We have research and development centers in the United States, France, Israel and Hong Kong. We have sales and service offices primarily in the U.S. and various locations in Europe and Asia. Our leases, which expire at various dates through June 2028, are for an aggregate of approximately 405,000 square feet of space, of which the San Jose lease, expiring August 2020, is for approximately 160,000 square feet of space. This excludes 33,000 square feet of space that is vacant and available for sublease. We have two business segments: Video and Cable Edge. Because of the interrelation of these segments, a majority of these segments use substantially all of the properties, at least in part, and we retain the flexibility to use each of the properties in whole or in part for each of the segments. We believe that the facilities that we currently occupy are adequate for our current needs and that suitable additional space will be available, as needed, to accommodate the presently foreseeable expansion of our operations.

Item 3. *LEGAL PROCEEDINGS*

In October 2011, Avid Technology, Inc. (“Avid”) filed a complaint in the United States District Court for the District of Delaware alleging that our MediaGrid product infringes two patents held by Avid. A jury trial on this complaint commenced on January 23, 2014 and, on February 4, 2014, the jury returned a unanimous verdict in favor of us, rejecting Avid’s infringement allegations in their entirety. In January 2015, Avid filed an appeal with respect to the jury’s verdict with the Federal Circuit. In January 2016, the Federal Circuit issued an order vacating the verdict of noninfringement and remanding the case to the trial court for a new trial on infringement.

In June 2012, Avid served a subsequent complaint in the United States District Court for the District of Delaware alleging that our Spectrum product infringes one patent held by Avid. The complaint sought injunctive relief and unspecified damages. In September 2013, the U.S. Patent Trial and Appeal Board (“PTAB”) authorized an inter partes review to be instituted as to claims 1-16 of the patent asserted in this second complaint. In July 2014, the PTAB issued a decision finding claims 1-10 invalid and claims 11-16 not invalid. We filed an appeal with respect to the PTAB’s decision on claims 11-16 in September 2014, and the Federal Circuit affirmed the PTAB’s decision in April 2016.

In July 2017, the court issued a scheduling order consolidating both cases and setting the trial date for November 6, 2017.

On October 19, 2017, the parties agreed to settle the consolidated cases by entering into a settlement and patent portfolio cross-license agreement, and the cases were dismissed with prejudice. In connection with the agreement, we recorded a \$6.0 million litigation settlement expense in “Selling, general and administrative expenses” in our 2017 Consolidated Statement of Operations. Of the associated \$6.0 million settlement liability, \$2.5 million was paid in October 2017 and the remaining \$1.5 million and \$2.0 million will be paid in the second quarter of 2019 and the third quarter of 2020, respectively.

From time to time, we are involved in lawsuits as well as subject to various legal proceedings, claims, threats of litigation, and investigations in the ordinary course of business, including claims of alleged infringement of third-party patents and other intellectual property rights, commercial, employment, and other matters. While certain matters to which we are a party may specify the damages claimed, such claims may not represent reasonably possible losses. Given the inherent uncertainties of litigation, the ultimate outcome of these matters cannot be predicted at this time, nor can the amount of possible loss or range of loss, if any, be reasonably estimated.

An unfavorable outcome on any litigation matters could require us to pay substantial damages, or, in connection with any intellectual property infringement claims, could require us to pay ongoing royalty payments or could prevent us from selling certain of our products. As a result, a settlement of, or an unfavorable outcome on, any of the matters referenced above or other litigation matters could have a material adverse effect on our business, operating results, financial position and cash flows.

Our industry is characterized by the existence of a large number of patents and frequent claims and related litigation regarding patent and other intellectual property rights. From time to time, third parties have asserted, and may in the future assert, exclusive patent, copyright, trademark and other intellectual property rights against us or our customers. Such assertions

arise in the normal course of our operations. The resolution of any such assertions and claims cannot be predicted with certainty.

Item 4. MINE SAFETY DISCLOSURE

Not applicable.

PART II

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

Market Information of our Common Stock

Our common stock is traded on The NASDAQ Global Select Market under the symbol HLIT, and has been listed on NASDAQ since our initial public offering on May 22, 1995. The following table sets forth, for the periods indicated, the high and low sales price per share of our common stock as reported on The NASDAQ Global Select Market:

Quarter ended	2017		2016	
	Sales Price		Sales Price	
	High	Low	High	Low
First quarter	\$ 6.10	\$ 4.90	\$ 4.04	\$ 2.85
Second quarter	6.00	4.90	3.64	2.51
Third quarter	5.35	2.80	5.99	2.72
Fourth quarter	4.55	2.85	6.13	3.80

Holders

As of February 28, 2018, there were approximately 380 holders of record of our common stock.

Dividend Policy

We have never declared or paid any dividends on our capital stock. At this time, we expect to retain future earnings, if any, for use in the operation and expansion of our business and do not anticipate paying any cash dividends in the foreseeable future.

Repurchases of Equity Securities by the Issuer

There were no stock repurchases during the year ended December 31, 2017. Our stock repurchase program expired on December 31, 2016. Further stock repurchases would require authorization from the Board.

Sales of Unregistered Securities

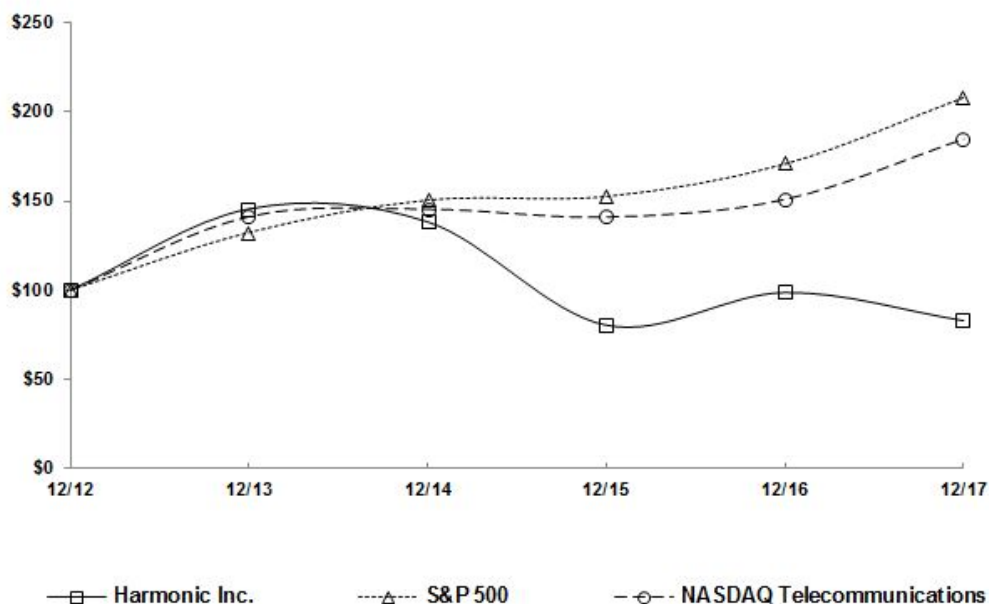
There were no sales of unregistered securities during the year ended December 31, 2017.

Stock Performance Graph

Set forth below is a line graph comparing the annual percentage change in the cumulative return to the stockholders of our common stock with the cumulative return of The NASDAQ Telecommunications Index and of the Standard & Poor's (S&P) 500 Index for the period commencing December 31, 2012 and ending on December 31, 2017. The graph assumes that \$100 was invested in each of the Company's common stock, the S&P 500 and The NASDAQ Telecommunications Index on December 31, 2012, and assumes the reinvestment of dividends, if any. The comparisons shown in the graph below are based upon historical data. Harmonic cautions that the stock price performance shown in the graph below is not indicative of, nor intended to forecast, the potential future performance of the Company's common stock.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among Harmonic Inc., the S&P 500 Index
and the NASDAQ Telecommunications Index



*\$100 invested on 12/31/12 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

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	12/12	12/13	12/14	12/15	12/16	12/17
Harmonic Inc.	100.00	145.56	138.26	80.28	98.62	82.84
S&P 500	100.00	132.39	150.51	152.59	170.84	208.14
NASDAQ Telecom	100.00	141.28	145.43	140.97	150.94	184.81

The information contained in this Stock Performance Graph section shall not be deemed to be "soliciting material", "filed" or incorporated by reference in previous or future filings with the SEC, or subject to the liabilities of Section 18 of the Exchange Act, except to the extent that Harmonic specifically incorporates it by reference into a document filed under the Securities Act or the Exchange Act.

Item 6. SELECTED FINANCIAL DATA

The selected financial data set forth below as of December 31, 2017 and 2016, and for the fiscal years ended December 31, 2017, 2016 and 2015, are derived from our Consolidated Financial Statements included elsewhere in this Annual Report on Form 10-K. The selected financial data as of December 31, 2015, 2014 and 2013, and for the fiscal years ended December 31, 2014 and 2013 are derived from audited financial statements not included in this Annual Report on Form 10-K. This financial data should be read in conjunction with Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, and the Consolidated Financial Statements and related notes included elsewhere in this Annual Report on Form 10-K. These historical results are not necessarily indicative of the results to be expected in the future.

On February 29, 2016, we completed our acquisition of TVN and applied the acquisition method of accounting for the business combination. The selected consolidated balance sheet data as of December 31, 2016 represents the consolidated statement of financial position of the combined company. The selected consolidated statement of operations data for the year ended December 31, 2016 of the combined entity includes 10 months of operating results of TVN, beginning March 1, 2016.

On March 5, 2013, we completed the sale of our cable access HFC business to Aurora Networks. As such, the results of operations associated with cable access HFC business are presented as discontinued operations in our Consolidated Statement of Operations for fiscal year ended December 31, 2013.

	Year ended December 31,				
	2017	2016	2015	2014	2013
	(In thousands, except per share amounts)				
Consolidated Statements of Operations Data					
Net revenue	\$ 358,246	\$ 405,911	\$ 377,027	\$ 433,557	\$ 461,940
Cost of revenue	188,426	205,161	174,315	221,209	241,495
Gross profit	169,820	200,750	202,712	212,348	220,445
Operating expenses:					
Research and development	95,978	98,401	87,545	93,061	99,938
Selling, general and administrative	136,270	144,381	120,960	131,322	134,014
Amortization of intangibles	3,142	10,402	5,783	6,775	8,096
Restructuring and related charges	5,307	14,602	1,372	2,761	1,421
Total operating expenses	240,697	267,786	215,660	233,919	243,469
Loss from operations	(70,877)	(67,036)	(12,948)	(21,571)	(23,024)
Interest income (expense), net	(11,078)	(10,628)	(333)	132	219
Other expense, net	(2,222)	(31)	(282)	(356)	(347)
Loss on impairment of long-term investment	(530)	(2,735)	(2,505)	—	—
Loss from continuing operations before income taxes	(84,707)	(80,430)	(16,068)	(21,795)	(23,152)
Provision for (benefit from) income taxes	(1,752)	(8,116)	(407)	24,453	(44,741)
Income (loss) from continuing operations	\$ (82,955)	\$ (72,314)	\$ (15,661)	\$ (46,248)	\$ 21,589
Net income (loss) per share from continuing operations:					
Basic	\$ (1.02)	\$ (0.93)	\$ (0.18)	\$ (0.50)	\$ 0.20
Diluted	\$ (1.02)	\$ (0.93)	\$ (0.18)	\$ (0.50)	\$ 0.20
Shares used in per share calculation:					
Basic	80,974	77,705	87,514	92,508	106,529
Diluted	80,974	77,705	87,514	92,508	107,808
	As of December 31,				
	2017	2016	2015	2014	2013
	(In thousands)				
Consolidated Balance Sheet Data					
Cash, cash equivalents and short-term investments	\$ 57,024	\$ 62,558	\$ 152,794	\$ 104,879	\$ 170,581
Working capital	\$ 29,686	\$ 71,938	\$ 201,250	\$ 142,754	\$ 243,650
Total assets	\$ 508,059	\$ 554,069	\$ 524,957	\$ 480,518	\$ 606,084
Convertible debt, long-term	\$ 108,748	\$ 103,259	\$ 98,295	\$ —	\$ —
Stockholders' equity	\$ 218,343	\$ 270,641	\$ 328,168	\$ 371,813	\$ 494,166

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

The following discussion should be read in conjunction with the consolidated financial statements and the related notes. The following discussion contains forward-looking statements that reflect our plans, estimates and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. Factors that could cause or contribute to these differences include, but are not limited to, those discussed below and those listed under Item 1A, Risks Factors.

Business Overview

We develop and sell (i) versatile and high performance video delivery software, products, system solutions and services that enable our customers to efficiently create, prepare, store, playout and deliver a full range of high-quality broadcast and OTT video services to consumer devices, including televisions, personal computers, laptops, tablets and smart phones and (ii) cable access solutions that enable cable operators to more efficiently and effectively deploy high-speed internet, voice and video services to consumers' homes.

We do business in three geographic regions: the Americas, EMEA and APAC and operate in two segments, Video and Cable Edge. Our Video business sells video processing, production and playout solutions, and services worldwide to cable operators and satellite and telco Pay-TV service providers, which we refer to collectively as "service providers," as well as to broadcast and media companies, including streaming new media companies. Our Video business infrastructure solutions are delivered either through shipment of our products, software licenses or as SaaS subscriptions. Our Cable Edge business sells cable access solutions and related services, including our CableOS software-based CCAP solutions, primarily to cable operators globally.

On February 29, 2016, we completed the acquisition of TVN. TVN is assigned to our Video segment and its results of operations are included in our Consolidated Statements of Operations beginning March 1, 2016. The TVN acquisition was primarily funded with cash proceeds from the issuance of the Notes in December 2015. The acquisition of TVN strengthened our competitive position in the video infrastructure market as well as enhanced the depth and scale of our research and development and service and support capabilities in the video arena.

Historically, our revenue has been dependent upon capital spending in the cable, satellite, telco, broadcast and media industries, including streaming media. Our customers' capital spending patterns are dependent on a variety of factors, including but not limited to: economic conditions in the U.S. and international markets; access to financing; annual budget cycles of each of the industries we serve; impact of industry consolidations; and customers suspending or reducing capital spending in anticipation of new products or new standards, new industry trends and/or technology shifts. If our product portfolio and product development plans do not position us well to capture an increased portion of the capital spending in the markets in which we compete, our revenue may decline. As we attempt to further diversify our customer base in these markets, we may need to continue to build alliances with other equipment manufacturers, content providers, resellers and system integrators, managed services providers and software developers; adapt our products for new applications; take orders at prices resulting in lower margins; and build internal expertise to handle the particular operational, payment, financing and/or contractual demands of our customers, which could result in higher operating costs for us.

A majority of our revenue has been derived from relatively few customers, due in part to the consolidation of our service provider customers. Sales to our 10 largest customers in 2017, 2016 and 2015 accounted for approximately 24%, 28% and 32% of our revenue, respectively. Although we are attempting to broaden our customer base by penetrating new markets and further expanding internationally, we expect to see continuing industry consolidation and customer concentration. During 2017 and 2016, no single customers accounted for more than 10% of our net revenue. During 2015, revenue from Comcast accounted for 12%, of our net revenue. No other single customer accounted for more than 10% of our net revenue in 2015. The loss of any significant customer, or any material reduction in orders from any significant customer, or our failure to qualify our new products with any significant customer could materially and adversely affect our operating results, financial condition and cash flows.

Our net revenue decreased \$47.7 million, or 12% in 2017, compared to 2016, due to a \$32.0 million and \$15.7 million decrease in our Video segment and Cable Edge segment revenue, respectively. The decrease in our Video segment revenue in 2017 was primarily due to the shift in customer investment priorities from our traditional Pay-TV broadcast products to OTT SaaS subscriptions, and an associated softer demand environment for traditional video broadcast products. The decrease in our Cable Edge segment revenue in 2017 was primarily due to continued weak demand for our legacy Cable Edge products due to technology transition in the industry from legacy EdgeQAM consumption used to deliver broadcast Pay-TV services to a new architecture that is capable of delivering converged video and IP data services.

Our Video segment customers continue to be cautious with investments in new technologies, such as next-generation IP architecture and Ultra HD. We believe a material and growing portion of the opportunities for our video business are linked to a migration by our customers to IP workflows and the distribution of linear and on-demand, OTT, and new mobile video services. We continue to steadily transition our video business away from legacy and customized computing hardware to more software-centric solutions and services, including OTT SaaS subscription offerings, enabling video compression and processing through our VOS software platform running on standard off-the-shelf servers, data centers and in the cloud.

Our Cable Edge strategy is to become a major player in the converged cable access platform (“CCAP”) market by delivering disruptive new virtualized DOCSIS 3.1 CMTS technology and related CCAP architectures, which we collectively refer to as CableOS. In the meantime, our Cable Edge segment is experiencing declining demand as our customers have decreased spending on our legacy Cable Edge products to prepare for the adoption of new virtualized DOCSIS 3.1 CMTS solutions and distributed access architectures. While these trends present near-term challenges for us, we continue to make progress in the development of CableOS solutions and growth of our CableOS business with expanded commercial deployments, field trials, and customer engagements since our first CableOS shipments in the fourth quarter of 2016.

To support our Cable Edge strategy and foster the further development and growth of this segment, in September 2016, we issued Comcast a Warrant to further incentivize them to purchase our products and adopt our technologies, particularly our CableOS CCAP systems. Pursuant to the Warrant, Comcast may, subject to certain vesting provisions, purchase up to 7,816,162 shares of our common stock, for a per share exercise price of \$4.76. Because the Warrant is considered an incentive for Comcast to purchase certain of the Company’s products, the value of the Warrant is recorded as a reduction in the Company’s net revenues to the extent such value does not exceed net revenues from pertinent sales to Comcast. (See Note 16, “Warrants,” of the Notes to our Consolidated Financial Statements for additional information).

As a result of the continued uncertainty regarding the timing of our customers’ investment decisions, we implemented restructuring plans, including our 2016, 2017 and 2018 restructuring plans, to better align the Company’s resources and strategic goals, while simultaneously implementing an extensive Company-wide expense control program. (See Note 10, “Restructuring and Related Charges” and Note 20, “Subsequent Event”, of the Notes to our Consolidated Financial Statements for additional information).

Our aggregate balance of cash and cash equivalents as of December 31, 2017 was \$57.0 million and during the fiscal year 2017, we generated \$3.1 million of cash from operations. We also entered into a \$15 million line of credit with Silicon Valley Bank in September 2017. We expect that our current sources of liquidity will provide us adequate liquidity based on our current plan for the next twelve months.

Critical Accounting Policies, Judgments and Estimates

The preparation of financial statements and related disclosures requires Harmonic to make judgments, assumptions and estimates that affect the reported amounts of assets and liabilities, the disclosure of contingencies and the reported amounts of revenue and expenses in the financial statements and accompanying notes. Material differences may result in the amount and timing of revenue and expenses if different judgments or different estimates were made. See Note 2 of the notes to our Consolidated Financial Statements for details of our accounting policies. Critical accounting policies, judgments and estimates that we believe have the most significant impact on Harmonic’s financial statements are set forth below:

- Revenue recognition;
- Valuation of inventories;
- Business combination;
- Impairment of goodwill or long-lived assets;
- Assessment of the probability of the outcome of current litigation;
- Accounting for income taxes; and
- Stock-based compensation.

Revenue Recognition

Harmonic’s principal sources of revenue are from the sale of hardware, software, hardware and software maintenance contracts, and the sale of end-to-end solutions, encompassing design, manufacture, test, integration and installation of products. We also derive subscription revenues, which are comprised of subscription fees from customers utilizing the Company’s cloud-

based media processing solutions. Harmonic recognizes revenue when persuasive evidence of an arrangement exists, delivery has occurred or services have been provided, the sale price is fixed or determinable, and collectability is reasonably assured. Subscription revenue is recognized based on usage.

We generally use contracts and customer purchase orders to determine the existence of an arrangement. Shipping documents and customer acceptance, when applicable, are used to verify delivery. We assess whether the sales price is fixed or determinable based on the payment terms associated with the transaction and whether the price is subject to refund or adjustment. We assess collectability based primarily on the creditworthiness of the customer, as determined by credit checks and analysis, as well as the customer's payment history.

Significant management judgments and estimates must be made in connection with determination of the revenue to be recognized in any accounting period. Because of the concentrated nature of our customer base, different judgments or estimates made for any one large contract or customer could result in material differences in the amount and timing of revenue recognized in any particular period.

We have multiple-element revenue arrangements that include hardware and software essential to the hardware product's functionality, non-essential software, services and support. We allocate revenue to all deliverables based on their relative selling prices. We determine the relative selling prices by first considering vendor-specific objective evidence of fair value ("VSOE"), if it exists; otherwise third-party evidence ("TPE") of the selling price is used. When we are unable to establish selling price using VSOE or TPE, we use our best estimate of selling price ("BESP") in our allocation of arrangement consideration. The objective of BESP is to determine the price at which we would transact a sale if the product or service were sold on a stand-alone basis. BESP is generally used for offerings that are not typically sold on a stand-alone basis or for new or highly customized offerings. The Company's process for determining BESP involves management's judgment, and considers multiple factors that may vary over time, depending upon the unique facts and circumstances related to each deliverable. If the facts and circumstances underlying the factors considered change or should future facts and circumstances lead the Company to consider additional factors, the Company's BESP may also change. Once revenue is allocated to all deliverables based on their relative selling prices, revenue related to hardware elements (hardware, essential software and related services) are recognized using a relative selling price allocation and non-essential software and related services are recognized under the residual method.

Sales of stand-alone software that are not considered essential to the functionality of the hardware continue to be subject to the software revenue recognition guidance. In accordance with the software revenue recognition guidance, the Company applies the residual method to recognize revenue for the delivered elements in stand-alone software transactions. Under the residual method, the amount of revenue allocated to delivered elements equals the total arrangement consideration, less the aggregate fair value of any undelivered elements, typically maintenance, provided that VSOE of fair value exists for all undelivered elements. We establish fair value by reference to the price the customer is required to pay when an item is sold separately, using contractually stated, substantive renewal rates, when applicable, or the price of recently completed stand alone sales transactions. Accordingly, the determination as to whether appropriate objective and reliable evidence of fair value exists can impact the timing of revenue recognition for an arrangement.

Solution sales for the design, manufacture, test, integration and installation of products are accounted for in accordance with applicable guidance on accounting for performance of construction/production contracts, using the percentage-of-completion method of accounting when various requirements for the use of this accounting guidance exist. Under the percentage-of-completion method, our revenue recognized reflects the portion of the anticipated contract revenue that has been earned, equal to the ratio of actual labor hours expended to total estimated labor hours to complete the project. Costs are recognized proportionally to the labor hours incurred. Management believes that, for each such project, labor hours expended in proportion to total estimated hours at completion represents the most reliable and meaningful measure for determining a project's progress toward completion. This requires us to estimate, at the outset of each project, a detailed project plan and associated labor hour estimates for that project. For contracts that include customized services for which labor costs are not reasonably estimable, the Company uses the completed contract method of accounting. Under the completed contract method, 100% of the contract's revenue and cost is recognized upon the completion of all services under the contract. If the estimated costs to complete a project exceed the total contract amount, indicating a loss, the entire anticipated loss is recognized. Our application of the percentage-of-completion method of accounting is subject to our estimates of labor hours to complete each project. In the event that actual results differ from these estimates or we adjust these estimates in future periods, our operating results, financial position or cash flows for a particular period could be adversely affected.

Revenue on shipments to resellers and systems integrators is generally recognized on delivery. Resellers and systems integrators purchase our products for specific capital equipment projects of the end-user and do not hold inventory as a standard operating practice. They perform functions that include importation, delivery to the end-customer, installation or integration, and post-sales service and support. Our agreements with these resellers and systems integrators have terms which are generally consistent with the standard terms and conditions for the sale of our equipment to end users and do not provide for product rotation or pricing allowances, as are typically found in agreements with stocking resellers. We have long-term relationships

with most of these resellers and systems integrators and substantial experience with similar sales of similar products. We do have instances of accepting product returns from resellers and system integrators. However, such returns typically occur in instances where the system integrator has designed a product into a project for the end user, but the integrator requests permission to return the component as it does not meet the specific project's functional requirements. Such returns are made solely at our discretion, as our agreements with resellers and system integrators do not provide for return rights. We have sufficient experience monitoring product returns from our resellers, and, accordingly, we have concluded that we should use a sell-in model for our reseller sales.

Valuation of Inventories

We state inventories at the lower of cost or net realizable value. Cost is computed using standard cost, which approximates actual cost, on a first-in, first-out basis. We write down the cost of excess or obsolete inventory to net realizable value based on future demand forecasts and historical consumption. If there were to be a sudden and significant decrease in demand for our products, or if there were a higher incidence of inventory obsolescence because of rapidly changing technology and customer requirements, we could be required to record additional charges for excess and obsolete inventory and our gross margin could be adversely affected. Inventory management is of critical importance in order to balance the need to maintain strategic inventory levels to ensure competitive lead times against the risk of inventory obsolescence because of rapidly changing technology and customer requirements.

Business Combination

We applied the acquisition method of accounting for business combinations to our acquisition of TVN, which closed on February 29, 2016. (See Note 6, "Business Acquisition," for additional information on TVN acquisition). Under this method of accounting, all assets acquired and liabilities assumed are recorded at their respective fair values at the date of the completion of the transaction. Determining the fair value of assets acquired and liabilities assumed requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, discount rates, intangibles and other asset lives, among other items. Fair value is defined as the price that would be received in a sale of an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price). Market participants are assumed to be buyers and sellers in the principal (most advantageous) market for the asset or liability. Additionally, fair value measurements for an asset assume the highest and best use of that asset by market participants. As a result, we may have been required to value the acquired assets at fair value measurements that do not reflect its intended use of those assets. Use of different estimates and judgments could yield different results. Any excess of the purchase price over the fair value of the net assets acquired is recognized as goodwill.

During the fourth quarter of 2016, we completed the accounting for this business combination.

Impairment of Goodwill or Long-lived Assets

Goodwill represents the difference between the purchase price and the estimated fair value of the identifiable assets acquired and liabilities assumed. We test for goodwill impairment at the reporting unit level, which is the same as our operating segment, on an annual basis in the fourth quarter of each of our fiscal years, and at any other time at which events occur or circumstances indicate that the carrying amount of goodwill may exceed its fair value.

The provisions of the accounting standard for goodwill and other intangibles allows us to first assess qualitative factors to determine whether it is necessary to perform the two-step quantitative goodwill impairment test. Various factors are considered in the qualitative assessment, including macroeconomic conditions, financial performance, or a sustained decrease in share price. If as a result of the qualitative assessment, it is deemed more likely than not that the fair value of a reporting unit is less than its carrying amount, management will perform the quantitative test.

We use a two-step process to determine the amount of goodwill impairment. The first step requires comparing the fair value of the reporting unit to its net book value, including goodwill. A potential impairment exists if the fair value of the reporting unit is lower than its net book value. The second step of the process, which is performed only if a potential impairment exists, involves determining the difference between the fair value of the reporting unit's net assets other than goodwill and the fair value of the reporting unit. If this difference is less than the net book value of goodwill, an impairment exists and is recorded.

In the first step, the fair value of each of our reporting units is determined using both the income and market valuation approaches. Under the income approach, the fair value of the reporting unit is based on the present value of estimated future cash flows that the reporting unit is expected to generate over its remaining life. Under the market approach, the value of the reporting unit is based on an analysis that compares the value of the reporting unit to values of publicly-traded companies in similar lines of business. In the application of the income and market valuation approaches, we are required to make estimates

of future operating trends and judgments on discount rates and other variables. Determining the fair value of a reporting unit is highly judgmental in nature and involves the use of significant estimates and assumptions. We base our fair value estimates on assumptions we believe to be reasonable but that are unpredictable and inherently uncertain. Actual future results related to assumed variables could differ from these estimates. In addition, we make certain judgments and assumptions in allocating shared assets and liabilities to determine the carrying values for each of our reporting units.

Under the income approach, we calculate the fair value of a reporting unit based on the present value of estimated future cash flows. Cash flow projections are based on management's estimates of revenue growth rates and operating margins, taking into consideration industry and market conditions. The discount rate used is based on the weighted-average cost of capital adjusted for the relevant risk associated with business-specific characteristics and the uncertainty related to the business's ability to execute on the projected cash flows. Under the market approach, we estimate the fair value based on market multiples of revenue and earnings derived from comparable publicly-traded companies with similar operating and investment characteristics as the reporting units, and then apply a control premium which is determined by considering control premiums offered as part of the acquisitions that have occurred in market segments that are comparable with our reporting units.

During the fourth quarter of 2017, we performed the first step of goodwill impairment testing for our two reporting units as part of our annual goodwill impairment test and concluded that goodwill was not impaired. We have not recorded any impairment charges related to goodwill for any prior periods.

We evaluate the recoverability of intangible assets and other long-lived assets when indicators of impairment are present. When impairment indicators are present, we evaluate the recoverability of intangible assets and other long-lived assets on the basis of undiscounted cash flows expected to result from the use of each asset group and its eventual disposition. If the undiscounted expected future cash flows are less than the carrying amount of the asset, an impairment loss is recognized in order to write down the carrying value of the asset to its estimated fair market value.

Assessment of the Probability of the Outcome of Current Litigation

From time to time, we are involved in lawsuits as well as subject to various legal proceedings, claims, threats of litigation, and investigations in the ordinary course of business, including claims of alleged infringement of third-party patents and other intellectual property rights, commercial, employment and other matters. We assess potential liabilities in connection with each lawsuit and threatened lawsuits and accrue an estimated loss for these loss contingencies if both of the following conditions are met: information available prior to issuance of the financial statements indicates that it is probable that a liability has been incurred at the date of the financial statements and the amount of loss can be reasonably estimated. While certain matters to which we are a party specify the damages claimed, such claims may not represent reasonably probable losses. Given the inherent uncertainties of litigation, the ultimate outcome of these matters cannot be predicted at this time, nor can the amount of possible loss or range of loss, if any, be reasonably estimated.

An unfavorable outcome on any litigation matters could require us to pay substantial damages, or, in connection with any intellectual property infringement claims, could require us to pay ongoing royalty payments or could prevent us from selling certain of our products. As a result, a settlement of, or an unfavorable outcome on, any of the matters referenced above or other litigation matters could have a material adverse effect on our business, operating results, financial position and cash flows.

See Note 19, "Legal Proceedings," of the notes to our Consolidated Financial Statements for additional information on the Avid litigation).

Accounting for Income Taxes

In preparing our financial statements, we estimate our income taxes for each of the jurisdictions in which we operate. This involves estimating our actual current tax exposures and assessing temporary differences resulting from differing treatment of items, such as reserves and accruals, for tax and accounting purposes. These differences result in deferred tax assets and liabilities, which are included within our Consolidated Balance Sheet.

We are subject to examination of our income tax returns by various tax authorities on a periodic basis. We regularly assess the likelihood of adverse outcomes resulting from such examinations to determine the adequacy of our provision for income taxes. We apply the provisions of the applicable accounting guidance regarding accounting for uncertainty in income taxes, which requires application of a more-likely-than-not threshold to the recognition and de-recognition of uncertain tax positions. If the recognition threshold is met, the applicable accounting guidance permits us to recognize a tax benefit measured at the largest amount of such tax benefit that, in our judgment, is more than fifty percent likely to be realized upon settlement. It further requires that a change in judgment related to the expected ultimate resolution of uncertain tax positions be recognized in earnings in the period in which such determination is made.

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We file annual income tax returns in multiple taxing jurisdictions around the world. A number of years may elapse before an uncertain tax position is audited and finally resolved. While it is often difficult to predict the final outcome or the timing of resolution of any particular uncertain tax position, we believe that our reserves for income taxes reflect the most likely outcome. We adjust these reserves, as well as the related interest and penalties, in light of changing facts and circumstances. If our estimate of tax liabilities proves to be less than the ultimate assessment, a further charge to expense would result. If payment of these amounts ultimately proves to be unnecessary, the reversal of the liabilities would result in tax benefits being recognized in the period when we determine the liabilities are no longer necessary. Any changes in estimate, or settlement of any particular position, could have a material impact on our operating results, financial condition and cash flows.

Stock-based Compensation

We measure and recognize compensation expense for all stock-based compensation awards made to employees and non-employee directors, including stock options, restricted stock units and awards related to our Employee Stock Purchase Plan (“ESPP”), based upon the grant-date fair value of those awards. The grant date fair value of restricted stock units is based on the fair value of our common stock on the date of grant. The grant date fair value of our stock options and ESPP is estimated using the Black-Scholes option pricing model.

The determination of fair value of stock options and ESPP on the date of grant, using an option-pricing model, is affected by our stock price, as well as assumptions regarding a number of highly complex and subjective variables. These variables include our expected stock price volatility over the term of the awards, actual and projected employee stock option exercise behaviors, risk-free interest rates, and expected dividends. We estimated the expected life of the awards based on an analysis of our historical experience of employee exercise and post-vesting termination behavior considered in relation to the contractual life of the options and purchase rights. The risk-free interest rate assumption is based upon observed interest rates appropriate for the expected term of the awards. We do not currently pay cash dividends on our common stock and do not anticipate doing so in the foreseeable future. Accordingly, our expected dividend yield is zero.

Prior to January 1, 2017, stock-based compensation expense was recorded net of estimated forfeitures and, accordingly, was recorded for only those stock-based awards that we expected to vest. Upon the adoption of Accounting Standard Update No. 2016-09, Compensation - Stock Compensation (Topic 718), issued by the Financial Accounting Standards Board, our accounting policy was changed to account for forfeitures as they occur. The change was applied on a modified retrospective approach with a cumulative effect adjustment of \$69,000 to retained earnings as of January 1, 2017 (which increased the accumulated deficit). The implementation of this accounting standard update has no impact to our statement of cash flows because we do not have any excess tax benefits from share-based compensation because our tax provision is primarily under full valuation allowance. No prior periods were recast as a result of this change in accounting policy.

We recognize the stock-based compensation expense for performance-based RSUs (“PRSUs”) based on the probability of achieving certain performance criteria, as defined in the PRSU agreements. We estimate the number of PRSUs ultimately expected to vest and recognize expense using the graded vesting attribution method over the requisite service period. Changes in our estimates related to probability of achieving certain performance criteria and number of PRSUs expected to vest could significantly affect the stock-based compensation expense from one period to the next.

If factors change and we employ different assumptions to determine the fair value of our stock-based compensation awards granted in future periods, the compensation expense that we record under it may differ significantly from what we have recorded in the current period.

See Note 12, “Employee Benefit Plans and Stock-based Compensation,” of the notes to our Consolidated Financial Statements for additional information.

Results of Operations

Net Revenue

The following table presents the breakdown of net revenue by geographical region (in thousands, except percentages):

	Year ended December 31,						
	2017	2016	2015	2017 vs. 2016		2016 vs. 2015	
Americas	\$ 171,736	\$ 207,249	\$ 212,568	\$ (35,513)	(17)%	\$ (5,319)	(3)%
EMEA	117,129	126,752	92,422	(9,623)	(8)%	34,330	37 %
APAC	69,381	71,910	72,037	(2,529)	(4)%	(127)	— %
Total net revenue	\$ 358,246	\$ 405,911	\$ 377,027	\$ (47,665)	(12)%	\$ 28,884	8 %

Regional revenue as a % of total net revenue:

Americas	48%	51%	56%
EMEA	33%	31%	25%
APAC	19%	18%	19%

Fiscal 2017 compared to Fiscal 2016

Net revenue in the Americas decreased \$35.5 million, or 17% in 2017, compared to 2016, largely due to decreased demand for our video products as customers transition investment from traditional linear broadcast video products to our new OTT and SaaS solutions, which are being used to stream premium video content to mobile devices, computers and smart TVs, including large screen Ultra HD TVs.

EMEA net revenue decreased \$9.6 million, or 8% in 2017, compared to 2016, primarily due to the aforementioned shift from traditional broadcast Pay-TV products to OTT technologies and SaaS subscriptions, partially offset by an increase in Cable Edge segment revenue as a result of increased customer demand for our new CableOS system, compared to 2016.

APAC net revenue decreased \$2.5 million, or 4% in 2017 compared 2016, primarily due to timing of customer investments in video infrastructure as well as the negative impact from the technology shift in both segments.

Fiscal 2016 compared to Fiscal 2015

Net revenue in the Americas decreased \$5.3 million, or 3%, in 2016 compared to 2015, primarily due to the transition to new DOCSIS 3.1 technologies, which has impacted our Cable Edge business in the near-term, offset in part by improved service provider spending for our Video products and services.

EMEA net revenue increased \$34.3 million, or 37%, in 2016 compared to 2015, primarily due to improved Video product and service revenue, which was partially offset by the decline in service provider demand for our Cable Edge products as they transition to new DOCSIS 3.1 technologies.

APAC net revenue decreased \$0.1 million in 2016 compared to 2015, primarily attributable to softer demand for our Cable Edge products due to the transition to DOCSIS 3.1 technologies, partially offset by increased Video service revenue from our service provider customers.

Gross Profit

The following presents the gross profit and gross profit as a percentage of net revenue (“gross margin”) (in thousands, except percentages):

	Year ended December 31,						
	2017	2016	2015	2017 vs. 2016		2016 vs. 2015	
Gross profit	\$ 169,820	\$ 200,750	\$ 202,712	\$ (30,930)	(15)%	\$ (1,962)	(1)%
As a percentage of net revenue (“gross margin”)	47.4%	49.5%	53.8%	(2.1)%		(4.3)%	

Gross margin decreased 2.1% in 2017, as compared to 2016, primarily due to an unfavorable product sales mix, including transition from our traditional linear broadcast products to our new SaaS solutions, as well as lower service margins due to increased CableOS field trial activities and new production introduction costs, higher under-absorbed factory overhead costs,

primarily driven by lower revenue and purchase levels year over year. In 2017, we recorded an inventory obsolescence charge of approximately \$3.7 million for our legacy Cable Edge product lines, compared to \$4.0 million in 2016.

Gross margin decreased 4.3% in 2016, as compared to 2015. The decrease in gross margin was primarily due to the inclusion of TVN's operating results which resulted in higher material, labor and overhead costs attributable to the additional headcount and facilities acquired in connection with the TVN acquisition. In addition, the restructuring costs incurred in 2016 related to the termination of employees of the TVN French Subsidiary under the TVN VDP, and the increase of \$3.7 million in amortization expense related to intangibles acquired from TVN. Gross margin was unfavorably impacted by an inventory obsolescence charge of approximately \$4.0 million for legacy Cable Edge product lines. These unfavorable margin impacts were offset in part by increased service and support revenue in 2016 compared to 2015.

Research and Development

Our research and development expense consists primarily of employee salaries and related expenses, contractors and outside consultants, supplies and materials, equipment depreciation and facilities costs, all associated with the design and development of new products and enhancements of existing products. The following table presents the research and development expenses and the expense as a percentage of net revenue (in thousands, except percentages):

	Year ended December 31,						
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015		
Research and development	\$ 95,978	\$ 98,401	\$ 87,545	\$ (2,423)	(2)%	\$ 10,856	12%
As a percentage of net revenue	26.8%	24.2%	23.2%				

The \$2.4 million, or 2%, decrease in research and development expense in 2017 compared to 2016 was primarily due to lower project material and outside consulting spending due to the completion of certain research and development projects in early 2017, lower employee compensation costs due to headcount reduction, and lower outside engineering services due to cost reduction efforts. The research and development expense in each of 2017 and 2016 were net of \$6.0 million in reimbursements of engineering spending in each of the year by one of our large customers, as well as \$5.9 million and \$6.1 million of French R&D tax credits, respectively.

The \$10.9 million, or 12%, increase in research and development expense in 2016 compared to 2015 was primarily due to the inclusion of TVN's post-acquisition research and development expenses and higher expenses for CableOS product development. Such increase was offset in part by \$6.0 million in reimbursements of engineering spending by one of our large customers, as well as \$6.1 million of French R&D tax credits in 2016.

Our TVN French Subsidiary participates in the French CIR program which allows companies to monetize eligible research expenses. We recognize R&D tax credits receivable from the French government for spending on innovative research and development as an offset to research and development expenses.

Selling, General and Administrative

The following table presents the selling, general and administrative expenses and the expense as a percentage of net revenue (in thousands, except percentages):

	Year ended December 31,						
	2017	2016	2015	2017 vs. 2016	2016 vs. 2015		
Selling, general and administrative	\$ 136,270	\$ 144,381	\$ 120,960	\$ (8,111)	(6)%	\$ 23,421	19%
As a percentage of net revenue	38.0%	35.6%	32.1%				

The \$8.1 million, or 6%, decrease in selling, general and administrative expenses in 2017 compared to 2016 was primarily due to lower TVN acquisition- and integration- related costs in 2017 as majority of the integration projects were completed in early 2017. In addition, lower headcount expenses and lower depreciation expenses from reduction in capital expenditure also contributed to the decrease year over year. These reductions were offset in part by a \$6.0 million charge related to the Avid litigation settlement in 2017. (See Note 18, "Commitments and Contingencies-Legal Proceedings," for additional information on the Avid litigation),

The \$23.4 million, or 19%, increase in selling, general and administrative expenses in 2016 compared to 2015 was primarily due to the inclusion of TVN's post acquisition selling, general and administrative expenses, as well as TVN acquisition- and integration- related costs. Such increases were offset in part by lower headcount expenses and efforts to reduce sales and marketing related expenses.

Segment Financial Results

The following table provides summary financial information by reportable segment (in thousands, except percentages):

	Year ended December 31,							
	2017 ⁽¹⁾	2016	2015	2017 vs. 2016		2016 vs. 2015		
Video								
Revenue	\$ 319,473	\$ 351,489	\$ 291,779	\$ (32,016)	(9)%	\$ 59,710	20 %	
Gross profit	173,414	194,044	167,573	(20,630)	(11)%	26,471	16 %	
Operating income (loss)	(2,024)	11,963	13,529	(13,987)	(117)%	(1,566)	(12)%	
<i>Segment revenue as % of total revenue</i>								
	89.2 %	86.6 %	77.4 %	2.6 %		9.2 %		
<i>Gross margin %</i>								
	54.3 %	55.2 %	57.4 %	(0.9)%		(2.2)%		
<i>Operating margin %</i>								
	(0.6)%	3.4 %	4.6 %	(4.0)%		(1.2)%		
Cable Edge								
Revenue	\$ 38,773	\$ 54,422	\$ 85,248	\$ (15,649)	(29)%	\$ (30,826)	(36)%	
Gross profit	8,892	21,174	37,832	(12,282)	(58)%	(16,658)	(44)%	
Operating loss	(23,154)	(12,131)	(1,599)	(11,023)	91 %	(10,532)	659 %	
<i>Segment revenue as % of total revenue</i>								
	10.8 %	13.4 %	22.6 %	(2.6)%		(9.2)%		
<i>Gross margin %</i>								
	22.9 %	38.9 %	44.4 %	(16.0)%		(5.5)%		
<i>Operating margin %</i>								
	(59.7)%	(22.3)%	(1.9)%	(37.4)%		(20.4)%		
Total								
Revenue	\$ 358,246	\$ 405,911	\$ 377,027	\$ (47,665)	(12)%	\$ 28,884	8 %	
Gross profit	182,306	215,218	205,405	(32,912)	(15)%	9,813	5 %	
Operating income (loss)	(25,178)	(168)	11,930	(25,010)	14,887 %	(12,098)	(101)%	

(1) We have historically employed an aggregate allocation methodology based on total revenues to attribute professional services revenue and sales expenses between our Video and Cable Edge segments. Beginning in the fourth quarter of 2017, we have prospectively changed to a more precise attribution methodology as the activities of selling and supporting our CableOS solution have become increasingly distinct from those of our Video solutions. The impact of making this change in the fourth quarter of 2017 compared to our historical approach was a reduction in operating income of \$2.4 million from our Video segment and a corresponding increase to the operating income of our Cable Edge segment. We believe that the updated allocation methodology will provide greater clarity regarding the operating metrics of our Video and Cable Edge business segments.

A reconciliation of our consolidated segment operating income (loss) to consolidated loss before income taxes is as follows (in thousands):

	Year ended December 31,		
	2017	2016	2015
Total segment operating income (loss)	\$ (25,178)	\$ (168)	\$ 11,930
Unallocated corporate expenses ⁽¹⁾	(20,767)	(38,972)	(2,794)
Stock-based compensation	(16,610)	(13,060)	(15,582)
Amortization of intangibles	(8,322)	(14,836)	(6,502)
Consolidated loss from operations	(70,877)	(67,036)	(12,948)
Non-operating expense, net	(13,830)	(13,394)	(3,120)
Loss before income taxes	\$ (84,707)	\$ (80,430)	\$ (16,068)

(1) We do not allocate amortization of intangibles, stock-based compensation, restructuring and related charges, TVN acquisition- and integration-related costs, and certain other non-recurring charges to the operating income for each segment because management does not include this information in the measurement of the performance of the operating segments.

Video

Our Video segment net revenue decreased \$32.0 million, or 9% in 2017, compared to 2016, due to a \$39.9 million decrease in video product revenue, offset in part by a \$7.9 million increase in video service revenue. The decrease in our Video segment net revenue in 2017 reflects our customers' transition from our traditional linear broadcast products to our new OTT technologies and SaaS solutions, partially offset by higher revenue due to the inclusion of two additional months of TVN post-acquisition revenue, compared to 2016. Video segment operating margin decreased 4.0% in 2017, compared to 2016, primarily due to decrease in video product revenue which led to higher unabsorbed factory overhead and higher inventory obsolescence charges for our legacy broadcast video inventory, offset partially by a decrease in discretionary operating expenses.

Our Video segment net revenue increased \$59.7 million, or 20%, in 2016 compared to 2015. This increase was primarily attributable to a \$40.6 million increase in video product revenue and a \$19.1 million increase in video service revenue, and such increases were primarily due to the acquisition of TVN which contributed approximately \$60.0 million of revenue in 2016. Video segment operating margin decreased 1.2% in 2016, compared to 2015, primarily due to unfavorable product mix and the inclusion of TVN's lower gross margins and higher headcount and facilities costs related to the TVN acquisition.

Cable Edge

Our Cable Edge segment net revenue decreased \$15.6 million, or 29% in 2017, compared to 2016, primarily due to continuing lower demand for our legacy EdgeQAM technologies as some of our customers defer purchases as they plan for a migration to next generation DOCSIS 3.1 technologies and CCAP architectures. Cable Edge segment operating margin decreased 37.4% in 2017, compared to 2016, due to the reduced demand for our legacy EdgeQAM products as well as higher service costs related to increased CableOS trial activity and new product introduction costs, as well as higher research and development expenses for CableOS development in 2017.

Our Cable Edge segment net revenue decreased \$30.8 million, or 36%, in 2016 compared to 2015. The decrease was primarily due to reduce in demand as some of our customers are deferring purchases as they plan their migration to next generation DOCSIS 3.1 technologies and CCAP architectures. Cable Edge segment operating margin decreased 20.4% in 2016, compared to 2015, primarily due to the decrease in Cable Edge segment revenue and higher research and development expenses for CableOS development.

Amortization of Intangibles

	Year ended December 31,						
	2017	2016	2015	2017 vs. 2016		2016 vs. 2015	
Amortization of intangibles	\$ 3,142	\$ 10,402	\$ 5,783	\$ (7,260)	(70)%	\$ 4,619	80%
As a percentage of net revenue	0.9%	2.6%	1.5%				

The decrease in amortization of intangibles expense in 2017, compared to 2016, was primarily because certain acquired intangible assets were fully amortized. The increase in the amortization of intangibles expense in 2016 compared to 2015 was primarily due to the amortization of intangibles related to the acquisition of TVN.

Restructuring and Related Charges

We implemented several restructuring plans in the past few years with the goal of bringing operational expenses to appropriate levels relative to our net revenues. We account for our restructuring plans under the authoritative guidance for exit or disposal activities. The restructuring and related charges are included in “Product cost of revenue” and “Operating expenses-restructuring and related charges” in the Consolidated Statements of Operations. The following table summarizes the restructuring and related charges (in thousands):

	Year ended December 31,						
	2017	2016	2015	2017 vs. 2016		2016 vs. 2015	
Product cost of revenue	\$ 1,279	\$ 3,400	\$ 113	\$ (2,121)	(62)%	\$ 3,287	2,909%
Operating expenses-Restructuring and related charges	5,307	14,602	1,372	(9,295)	(64)%	13,230	964%
Total	\$ 6,586	\$ 18,002	\$ 1,485	\$ (11,416)	(63)%	\$ 16,517	1,112%

The \$11.4 million decrease in restructuring and related charges in 2017, compared to 2016, was primarily due to lower TVN VDP costs in 2017, compared to 2016. Most of the TVN VDP costs were recorded in 2016 based on the departing employees’ service period.

The \$16.5 million increase in restructuring and related charges in 2016, compared to 2015, was primarily due to the VDP implemented in the fourth quarter of 2016 to allow the employees in the TVN French Subsidiary to voluntarily terminate their employment with certain benefits. Based on the applicable accounting guidance, we recorded \$13.1 million restructuring and related charges under the TVN VDP in 2016. In 2016, we also recorded a \$2.2 million restructuring and related charge related to our excess facility at the U.S. headquarters in San Jose, California.

See Note 10, “Restructuring and Related Charges,” of the notes to our Consolidated Financial Statements for details on each of our restructuring plans.

Interest Expense, Net

Interest expense, net was \$11.1 million, \$10.6 million and \$0.3 million during 2017, 2016 and 2015, respectively. The increase in interest expense, net from 2015 to 2016 is primarily due to increased amortization of discount and issuance costs for the Notes issued in December 2015. (See Note 11, “Convertible Notes, Other Debts and Capital Leases,” of the notes to our Consolidated Financial Statements for additional information on the Notes).

Other Expense, Net

Other expense, net was \$2.2 million, \$31,000 and \$0.3 million during 2017, 2016 and 2015, respectively. Other expense, net is primarily comprised of foreign exchange gains and losses on cash, accounts receivable and intercompany balances denominated in currencies other than the functional currency of the reporting entity. Our foreign currency exposure is primarily driven by the fluctuations in the foreign currency exchanges rates of the Euro, British pound, Japanese yen and Israeli shekels. The increase in other expense, net in 2017 compared to 2016 was primarily due to the effect of the strengthening of the Euro and British pound on our intercompany balances. See “Foreign Currency Exchange Risk” under Item 7A of this Annual Report on Form 10-K for additional information.

Loss on Impairment of Long-term Investment

Since mid-2016, the stock price of Vislink, our equity investment which trades on the AIM exchange, has traded below its cost basis. Based on our assessment of the positive and negative factors of Vislink’s financial and business conditions, we believe that more-likely-than-not, Vislink’s stock price may not recover to its cost basis and, as a result, we recorded a total of \$2.7 million impairment charges in 2016. In February 2017, Vislink completed the disposal of its hardware division and changed its name to Pebble Beach Systems (from thereon, referred to as Pebble Beach Systems). In February 2017, Pebble Beach Systems also announced its financial results for fiscal 2016 which showed a significant increase in operating losses and at the same time Pebble Beach Systems announced that it was considering a sale of the company. Since February 2017, Pebble Beach Systems’ stock price has declined to below our reduced cost basis. In view of Pebble Beach Systems’ potential sale opportunity, we determined that the decline in the fair value of Pebble Beach Systems’ investment in the first nine months of 2017 was not considered permanent yet. However, in the fourth quarter of 2017, Pebble Beach Systems announced that it had

terminated its sale process due to lack of viable offers and that it would work on refinancing its debts and revising its bank covenants to improve its liquidity. Based on this fourth quarter announcement, without the sale opportunity and its highly leveraged financial conditions, we believe that it is more-likely-than-not that Pebble Beach Systems' investment is recoverable. As a result, during the fourth quarter of 2017, we wrote off the remaining carrying value and released all the balances in the accumulated other comprehensive loss to earnings, resulting in an impairment charge of \$0.5 million in the fourth quarter of 2017.

In 2015, based on our assessment of VJU's expected cash flows, we determined that the investment in VJU was not expected to be recoverable, as a result, we recorded an impairment charge of \$2.5 million in 2015. The VJU investment was sold for \$6,000 in the fourth quarter of 2017.

Income Taxes

We reported the following operating results for each of the three years ended December 31, 2017, 2016 and 2015 (in thousands, except percentages):

	Year ended December 31,		
	2017	2016	2015
Loss before income taxes	(84,707)	(80,430)	(16,068)
Benefit from income taxes	(1,752)	(8,116)	(407)
Effective income tax rate	2%	10%	3%

Our effective tax rate generally differs from the U.S. federal statutory rate of 35% due to favorable tax rates associated with certain earnings from our operations in lower tax jurisdictions throughout the world and our valuation allowance in the U.S. In addition, our effective tax rates vary in each period primarily due to specific one-time, discrete items that affected the tax rate in the respective period.

In 2017, our effective income tax rate of 2% differed from the U.S. federal statutory rate of 35% primarily due to our geographical income mix, favorable tax rates associated with certain earnings from operations in lower-tax jurisdictions, tax rate changes in foreign jurisdictions, tax benefits associated with the release of tax reserves for uncertain tax positions resulting from the expiration of the applicable statute of limitations, a one-time benefit from the reduction of a valuation allowance on alternative minimum tax ("AMT") credit carryforwards that will be refundable as a result of the TCJA, partially offset by the increase in the valuation allowance against U.S. federal, California and other state deferred tax assets, detriment from non-deductible stock-based compensation, and the net of various other discrete tax adjustments.

On December 22, 2017, the Tax Cuts and Jobs Act (the "TCJA") was enacted which, among other things, lowered the U.S. federal corporate income tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. As of December 31, 2017, we have not completed the accounting for the tax effects of enactment of the TCJA; however, the effects on existing deferred tax balances has been determined and recorded. The impact of remeasuring deferred tax assets at a lower tax rate is a \$14.5 million reduction of the value of net deferred tax assets (which represent future tax benefits), which is offset by a corresponding reduction in the related valuation allowance. As a result, there is net zero impact to our tax expense for 2017. Under the TCJA, the corporate AMT was repealed. Therefore, corporations which have been unable to utilize AMT credit carryforwards now have the opportunity to realize them through cash refunds. We have an AMT credit carryforward of \$2.6 million that previously was not considered realizable and as such had a valuation allowance recorded. As a result of the TCJA, the valuation allowance was released and is reflected as a benefit in our 2017 income tax provision. We have reclassified the \$2.6 million credit carryforward to other receivables in the consolidated balance sheet to reflect the expected cash refund.

The TCJA also includes a requirement to pay a one-time transition tax on the cumulative value of earnings and profits that were previously not repatriated for U.S. income tax purposes. Although we currently do not expect to be impacted by the mandatory deemed repatriation provision of the TCJA, because we believe our cumulative unremitted earnings and profits are negative, due to the complexity of our international tax and legal entity structure, we will continue to analyze the earnings and profits and tax pools of our foreign subsidiaries to reasonably estimate the effects of the mandatory deemed repatriation provision of the TCJA over the one-year measurement period.

In 2016, our effective income tax rate of 10% differed from the then-applicable U.S. federal statutory rate of 35% primarily due to our geographical income mix and our tax valuation allowance, favorable tax rates associated with certain earnings from operations in lower-tax jurisdictions, favorable resolutions of uncertain tax positions, and the tax benefit from the realization of certain deferred tax assets as a result of the TVN acquisition, partially offset by the increase in the

valuation allowance against U.S. federal, California and other state deferred tax assets, detriment from non-deductible stock-based compensation, non-deductible amortization of foreign intangibles, and the net of various discrete tax adjustments.

In 2015, our effective income tax rate of 3% differed from the then-applicable U.S. federal statutory rate of 35%, primarily due to a difference in foreign tax rates and our losses generated in the United States for the year received no tax benefit as a result of a full valuation allowance against all of our U.S. deferred tax assets, as well as adjustments relating to our 2014 U.S. federal tax return filed in September 2015 and a reversal of uncertain tax positions resulting from the expiration of statutes of limitations. In addition, the impairment of the VJU investment (see Note 3, “Investments in Other Equity Securities”) received no tax benefit.

For a reconciliation of our effective tax rate to the U.S. federal statutory rate of 35% and further explanation of our provision for taxes, see Note 14, “Income Taxes,” of the notes to our Consolidated Financial Statements.

Liquidity and Capital Resources

As of December 31, 2017, our principal sources of liquidity consisted of cash and cash equivalents of \$57.0 million, net accounts receivable of \$69.8 million, our \$15 million line of credit with Silicon Valley Bank, described in more detail below, and financing from French government agencies. As of December 31, 2017, we had \$128.25 million in convertible senior notes outstanding (“Notes”), which are due on December 1, 2020. The Notes bear interest at a fixed rate of 4.00% per year, payable semiannually in arrears on June 1 and December 1 of each year. We also had debts with French government agencies and to a lesser extent, with other financial institutions, primarily in France, in the aggregate of \$22.9 million at December 31, 2017.

Our cash and cash equivalents of \$57.0 million as of December 31, 2017 consisted of bank deposits held throughout the world, of which \$33.5 million of the cash and cash equivalents balance was held outside of U.S. At present, such foreign funds are considered to be indefinitely reinvested in foreign countries to the extent of indefinitely reinvested foreign earnings. In the event funds from foreign operations are needed to fund cash needs in the United States and if U.S. taxes have not already been previously accrued, we may be required to accrue and pay additional U.S. and foreign withholding taxes in order to repatriate these funds.

Our principal uses of cash will include repayments of debt and related interest, purchases of inventory, payroll, restructuring expenses, and other operating expenses related to the development and marketing of our products, purchases of property and equipment and other contractual obligations for the foreseeable future. We believe that our cash and cash equivalents of \$57.0 million at December 31, 2017 will be sufficient to fund our principal uses of cash for at least the next 12 months. However, if our expectations are incorrect, we may need to raise additional funds to fund our operations, to take advantage of unanticipated strategic opportunities or to strengthen our financial position. In the future, we may enter into other arrangements for potential investments in, or acquisitions of, complementary businesses, services or technologies, which could require us to seek additional equity or debt financing. Additional funds may not be available on terms favorable to us or at all.

On September 27, 2017, we entered into a Loan and Security Agreement (the “Loan Agreement”) with Silicon Valley Bank (the “Bank”). The Loan Agreement provides for a secured revolving credit facility in an aggregate principal amount of up to \$15.0 million. Under the terms of the Loan Agreement, the principal amount of loans, plus the face amount of any outstanding letters of credit, at any time cannot exceed up to 85% of our eligible receivables. Under the terms of the Loan Agreement, we may also request letters of credit from the Bank. Loans under the Loan Agreement will bear interest at our option, and subject to certain conditions, at an annual rate of either a prime rate or a LIBOR rate plus an applicable margin of 2.25%. There will be no applicable margin for prime rate advances when we are in compliance with the liquidity requirement of at least \$20.0 million in the aggregate of consolidated cash plus availability under the Loan Agreement (the “Liquidity Requirement”) and a 0.25% margin for prime rate advances when we are not in compliance with the Liquidity Requirement. We may not request LIBOR advances when not in compliance with the Liquidity Requirement. Interest on each advance is due and payable monthly and the principal balance is due at maturity. Our obligations under the revolving credit facility are secured by a security interest on substantially all of its assets, excluding intellectual property. The Loan Agreement contains customary affirmative and negative covenants. We must comply with financial covenants requiring maintaining (i) a minimum short-term asset to short-term liabilities ratio and (ii) minimum adjusted EBITDA, in the amounts and for the periods as set forth in the Loan Agreement. We must also maintain a minimum liquidity amount, comprised of unrestricted cash held at accounts with the Bank plus proceeds available to be drawn under the Loan Agreement, equal to \$10.0 million at all times. There were no borrowings under the Loan Agreement from the closing of the Loan Agreement through December 31, 2017. As of December 31, 2017, we were in compliance with the covenants under the Loan Agreement.

The table below presents selected cash flow data for the periods presented (in thousands):

	Year ended December 31,		
	2017	2016	2015
	(In thousands)		
Net cash provided by operating activities	\$ 3,064	\$ 438	\$ 6,351
Net cash used in investing activities	(4,213)	(70,478)	(10,414)
Net cash provided by (used in) financing activities	895	(152)	57,533
Effect of exchange rate changes on cash and cash equivalents	1,643	(363)	(312)
Net increase (decrease) in cash and cash equivalents	<u>\$ 1,389</u>	<u>\$ (70,555)</u>	<u>\$ 53,158</u>

Operating Activities

Net cash provided by operating activities increased \$2.6 million in 2017 compared to 2016, primarily due to more cash being generated from net working capital, offset in part by a \$1.2 million increase in net loss, after adjustments for non-cash items.

Net cash provided by operating activities decreased \$5.9 million in 2016 compared to 2015, primarily due to a \$43.5 million increase in net loss, after adjustments for non-cash items, mainly attributable to a lower operating margin and the payment of TVN's post-acquisition expenses and restructuring expenses. These decreases were offset in part by less cash used for net working capital needs, primarily attributable to an increase in deferred revenue due to the timing of customer renewals of their annual service and support contracts, and, to a lesser extent, less cash spent on the purchase of inventory .

We expect that cash provided by operating activities may fluctuate in future periods as a result of a number of factors, including fluctuations in our operating results, shipment linearity, accounts receivable collections performance, inventory and supply chain management, and the timing and amount of compensation and other payments.

Investing Activities

Net cash used in investing activities decreased \$66.3 million in 2017 compared to 2016, primarily due to the \$75.7 million net cash paid for the TVN acquisition in 2016 and less cash used for purchases of property and equipment, offset in part by lesser proceeds from sale and maturities of marketable investments.

Net cash used in investing activities increased \$60.1 million in 2016 compared to 2015, primarily due to the \$75.7 million net cash paid for the TVN acquisition in 2016, offset in part by lower cash used for purchases of marketable investments. In 2016, no cash was used for the purchase of marketable investments, compared to \$25.3 million used for purchases of marketable investments in 2015.

Financing Activities

Net cash provided by financing activities increased \$1.0 million in 2017 compared to 2016, primarily due to lower net debt payments in 2017, offset in part by higher payments of tax withholding obligations related to net share settlements of RSUs in 2017.

Net cash provided by financing activities decreased \$57.7 million in 2016 compared to 2015, primarily due to the net proceeds of \$124.7 million from the sale and issuance of the Notes in December 2015, offset in part by \$72.9 million cash used for share repurchases in 2015.

Off-Balance Sheet Arrangements

None as of December 31, 2017.

Contractual Obligations and Commitments

Future payments under contractual obligations and other commercial commitments, as of December 31, 2017 are as follows (in thousands):

Payments due in each fiscal year

	Total Amounts Committed	Less than 1 year	1 to 3 years	4 to 5 years	More than 5 years
Convertible debt	\$ 128,250	\$ —	\$ 128,250	\$ —	\$ —
Interest on convertible debt	15,390	5,130	10,260	—	—
Other debts	21,847	6,674	14,083	989	101
Capital Lease	1,099	930	146	23	—
Operating leases ⁽¹⁾	48,982	13,534	20,848	5,455	9,145
Purchase commitments ⁽²⁾	40,226	30,711	7,596	1,919	—
TVN VDP obligations ⁽³⁾	5,128	3,186	1,942	—	—
Avid litigation settlement fees	3,500	—	3,500	—	—
Total contractual obligations	\$ 264,422	\$ 60,165	\$ 186,625	\$ 8,386	\$ 9,246
Other commercial commitments:					
Standby letters of credit	\$ 265	\$ 198	\$ 67	\$ —	\$ —
Indemnification obligations ⁽⁴⁾	—	—	—	—	—
Total commercial commitments	\$ 265	\$ 198	\$ 67	\$ —	\$ —

(1) We lease facilities under operating leases expiring through June 2028. Certain of these leases provide for renewal option for periods ranging from one to five years in the normal course of business.

(2) During the normal course of business, in order to reduce manufacturing lead times and ensure adequate component supply, we enter into agreements with certain contract manufacturers and suppliers that allow them to procure inventory and services based upon criteria as defined by the Company.

(3) In 2016, we established the TVN VDP to enable the French employees of TVN to voluntarily terminate their employment with certain benefits. See Note 10, “Restructuring and Related Charges-TVN VDP,” of the notes to our Consolidated Financial Statements for additional information.

(4) We indemnify our officers and the members of our Board pursuant to our bylaws and contractual indemnity agreements. We also indemnify some of our suppliers and most of our customers for specified intellectual property matters and some of our other vendors, such as building contractors, pursuant to certain parameters and restrictions. The scope of these indemnities varies, but, in some instances, includes indemnification for defense costs, damages and other expenses (including reasonable attorneys’ fees).

Due to the uncertainty with respect to the timing of future cash flows associated with our unrecognized tax benefits at December 31, 2017, we are unable to make reasonably reliable estimates of the period of cash settlement with the respective taxing authority. Therefore, \$0.9 million of unrecognized tax benefits classified as “Income taxes payable, long-term” in the accompanying Consolidated Balance Sheet as of December 31, 2017, had been excluded from the contractual obligations table above. See Note 14, “Income Taxes,” of the notes to our Consolidated Financial Statements for a discussion on income taxes.

New Accounting Pronouncements

See Note 2 of the accompanying Consolidated Financial Statements for a full description of recent accounting pronouncements, including the respective expected dates of adoption and effects on results of operations and financial condition.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.
Foreign Currency Exchange Risk

We market and sell our products and services through our direct sales force and indirect channel partners in North America, EMEA, APAC and Latin America. Accordingly, we are subject to exposure from adverse movements in foreign currency exchange rates, primarily the Euro, British pound and Japanese yen. Our U.S. dollar functional subsidiaries, which

account for approximately 95%, 88% and 100% of our consolidated net revenues in 2017, 2016 and 2015, respectively, recorded net billings denominated in foreign currencies of approximately 18%, 13% and 12% of their net revenues in 2017, 2016 and 2015, respectively. The increase was primarily due to the acquisition of TVN which increased our foreign customer base. In addition, a portion of our operating expenses, primarily the cost of personnel to deliver technical support on our products and professional services, sales and sales support and research and development, are denominated in foreign currencies, primarily the Israeli shekel.

We use derivative instruments, primarily forward contracts, to manage exposures to foreign currency exchange rates and we do not enter into foreign currency forward contracts for trading purposes.

Derivatives Not Designated as Hedging Instruments (Balance Sheet Hedges)

We enter into forward currency contracts to hedge foreign currency denominated monetary assets and liabilities. These derivative instruments are marked to market through earnings every period and mature generally within three months. Changes in the fair value of these foreign currency forward contracts are recognized in "Other expense, net" in the Consolidated Statement of Operations, and are largely offset by the changes in the fair value of the assets or liabilities being hedged.

The U.S. dollar equivalents of all outstanding notional amounts of foreign currency forward contracts are summarized as follows (in thousands):

	December 31,	
	2017	2016
Derivatives not designated as hedging instruments:		
Purchase	\$ 12,875	\$ 4,056
Sell	\$ 1,509	\$ 11,157

Interest Rate Risk

Our exposure to market risk for changes in interest rates relates primarily to our investment portfolio of marketable investment securities and outstanding debt arrangements with variable rate interests as well as our borrowings under the Loan Agreement.

On September 27, 2017, we entered into the Loan Agreement with Silicon Valley Bank. The Loan Agreement provides for a secured revolving credit facility in an aggregate principal amount of up to \$15.0 million. Loans under the Loan Agreement will bear interest, at our option, and subject to certain conditions, at an annual rate of either a prime rate or a LIBOR rate (each as customarily defined), plus an applicable margin. The applicable margin for LIBOR rate advances is 2.25%. There will be no applicable margin for prime rate advances when we are in compliance with the Liquidity Requirement and a margin of 0.25% for prime rate advances when we are not in compliance with the Liquidity Requirement. We may not request LIBOR advances when it is not in compliance with the Liquidity Requirement. Interest on each advance is due and payable monthly and the principal balance is due at maturity.

We have no borrowings under the Loan Agreement from the closing of the Loan Agreement through December 31, 2017.

As of December 31, 2017, our cash balance was \$57.0 million. We had no short-term investments as of December 31, 2017.

As a result of the TVN acquisition, we assumed various debt instruments. The aggregate debt balance of such instruments at December 31, 2017 was \$22.9 million, of which \$1.1 million relates to obligations under capital leases with fixed interest rates. The remaining \$21.8 million are debt instruments primarily financed by French government agencies, and, to a lesser extent, term loans from other financing institutions. These debt instruments have maturities ranging from three to eight years; expiring from 2018 through 2025. A majority of the loans are tied to the 1 month EURIBOR rate plus spread. (See Note 11, "Convertible notes, Other Debts and Capital Leases," of the notes to our Consolidated Balance Sheets for additional information). As of December 31, 2017, a hypothetical 1.0% increase in market interest rates on our debts subject to variable interest rate fluctuations would increase our interest expense by approximately \$0.3 million annually.

As of December 31, 2017, we had \$128.25 million aggregate principal amount of the Notes outstanding, which have a fixed 4.0% coupon rate.

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Item 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Harmonic Inc.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Harmonic Inc. and its subsidiaries (the “Company”) as of December 31, 2017 and 2016, and the related consolidated statements of operations, comprehensive loss, stockholder’s equity, and cash flows for each of the three years in the period ended December 31, 2017, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2017 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company’s management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company’s internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (“PCAOB”) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

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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/PricewaterhouseCoopers LLP

San Jose, California

March 5, 2018

We have served as the Company's auditor since 1989.

HARMONIC INC.
CONSOLIDATED BALANCE SHEETS
(In thousands, except per share data)

	December 31,	
	2017	2016
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 57,024	\$ 55,635
Short-term investments	—	6,923
Accounts receivable, net	69,844	86,765
Inventories	25,976	41,193
Prepaid expenses and other current assets	18,931	26,319
Total current assets	171,775	216,835
Property and equipment, net	29,265	32,164
Goodwill	242,827	237,279
Intangibles, net	21,279	29,231
Other long-term assets	42,913	38,560
Total assets	\$ 508,059	\$ 554,069
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Other debts and capital lease obligations, current	\$ 7,610	\$ 7,275
Accounts payable	33,112	28,892
Income taxes payable	233	1,166
Deferred revenue	52,429	52,414
Accrued and other current liabilities	48,705	55,150
Total current liabilities	142,089	144,897
Convertible notes, long-term	108,748	103,259
Other debts and capital lease obligations, long-term	15,336	13,915
Income taxes payable, long-term	917	2,926
Other non-current liabilities	22,626	18,431
Total liabilities	289,716	283,428
Commitments and contingencies (Note 18)		
Stockholders' equity:		
Preferred stock, \$0.001 par value, 5,000 shares authorized; no shares issued or outstanding	—	—
Common stock, \$0.001 par value, 150,000 shares authorized; 82,554 and 78,456 shares issued and outstanding at December 31, 2017 and 2016, respectively	83	78
Additional paid-in capital	2,272,690	2,254,055
Accumulated deficit	(2,057,812)	(1,976,222)
Accumulated other comprehensive income (loss)	3,382	(7,270)
Total stockholders' equity	218,343	270,641
Total liabilities and stockholders' equity	\$ 508,059	\$ 554,069

The accompanying notes are an integral part of these consolidated financial statements.

HARMONIC INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(In thousands, except per share data)

	Year ended December 31,		
	2017	2016	2015
Revenue:			
Product	\$ 224,645	\$ 285,260	\$ 276,876
Service	133,601	120,651	100,151
Total net revenue	358,246	405,911	377,027
Cost of revenue:			
Product	119,802	145,714	121,988
Service	68,624	59,447	52,327
Total cost of revenue	188,426	205,161	174,315
Total gross profit	169,820	200,750	202,712
Operating expenses:			
Research and development	95,978	98,401	87,545
Selling, general and administrative	136,270	144,381	120,960
Amortization of intangibles	3,142	10,402	5,783
Restructuring and related charges	5,307	14,602	1,372
Total operating expenses	240,697	267,786	215,660
Loss from operations	(70,877)	(67,036)	(12,948)
Interest expense, net	(11,078)	(10,628)	(333)
Other expense, net	(2,222)	(31)	(282)
Loss on impairment of long-term investment	(530)	(2,735)	(2,505)
Loss before income taxes	(84,707)	(80,430)	(16,068)
Benefit from income taxes	(1,752)	(8,116)	(407)
Net loss	\$ (82,955)	\$ (72,314)	\$ (15,661)
Net loss per share:			
Basic and diluted	\$ (1.02)	\$ (0.93)	\$ (0.18)
Shares used in per share calculations:			
Basic and diluted	80,974	77,705	87,514

The accompanying notes are an integral part of these consolidated financial statements.

HARMONIC INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands)

	Year ended December 31,		
	2017	2016	2015
Net loss	\$ (82,955)	\$ (72,314)	\$ (15,661)
Other comprehensive income (loss), before tax:			
Change in unrealized gain (loss) on cash flow hedges:			
Unrealized gain (loss), net arising during the period	—	202	(133)
Loss (gain) reclassified into earnings	—	44	(424)
	—	246	(557)
Change in unrealized gain (loss) on available-for-sale securities:			
Unrealized loss, net arising during the period	(658)	(903)	(785)
Loss reclassified into earnings	384	2,735	—
	(274)	1,832	(785)
Adjustment to pension benefit plan	528	(279)	—
Unrealized foreign exchange loss, net on intercompany long-term loans arising during the period	(1,705)	—	—
Change in foreign currency translation adjustments:			
Translation gain (loss) arising during the period	11,471	(4,633)	(1,111)
Loss reclassified into earnings	106	—	—
	11,577	(4,633)	(1,111)
Other comprehensive income (loss) before tax	10,126	(2,834)	(2,453)
Provision for (benefit from) income taxes	(526)	18	(15)
Other comprehensive income (loss), net of tax	10,652	(2,852)	(2,438)
Total comprehensive loss	\$ (72,303)	\$ (75,166)	\$ (18,099)

The accompanying notes are an integral part of these consolidated financial statements.

HARMONIC INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands)

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Loss	Total Stockholders' Equity
	Shares	Amount				
Balance at December 31, 2014	87,700	\$ 88	\$ 2,261,952	\$ (1,888,247)	\$ (1,980)	\$ 371,813
Net loss	—	—	—	(15,661)	—	(15,661)
Other comprehensive loss, net of tax	—	—	—	—	(2,438)	(2,438)
Issuance of common stock under option, stock award and purchase plans	2,855	3	5,670	—	—	5,673
Repurchase of common stock	(14,540)	(15)	(72,848)	—	—	(72,863)
Stock-based compensation	—	—	15,582	—	—	15,582
Conversion feature of convertible notes due 2020	—	—	26,062	—	—	26,062
Balance at December 31, 2015	76,015	76	2,236,418	(1,903,908)	(4,418)	328,168
Net loss	—	—	—	(72,314)	—	(72,314)
Other comprehensive loss, net of tax	—	—	—	—	(2,852)	(2,852)
Issuance of common stock under option, stock award and purchase plans	2,441	2	2,798	—	—	2,800
Stock-based compensation	—	—	13,242	—	—	13,242
Issuance of warrant	—	—	1,597	—	—	1,597
Balance at December 31, 2016	78,456	78	2,254,055	(1,976,222)	(7,270)	270,641
Cumulative effect to retained earnings related to adoption of ASU 2016-09 ⁽¹⁾	—	—	69	(69)	—	—
Cumulative effect to retained earnings related to adoption of ASU 2016-16 ⁽¹⁾	—	—	—	1,434	—	1,434
Balance at January 1, 2017	78,456	78	2,254,124	(1,974,857)	(7,270)	272,075
Net loss	—	—	—	(82,955)	—	(82,955)
Other comprehensive income, net of tax	—	—	—	—	10,652	10,652
Issuance of common stock under option, stock award and purchase plans	4,098	5	1,954	—	—	1,959
Stock-based compensation	—	—	16,612	—	—	16,612
Balance at December 31, 2017	82,554	\$ 83	\$ 2,272,690	\$ (2,057,812)	\$ 3,382	\$ 218,343

(1) See Note 2, "Summary of Significant Accounting Policies-Recent Accounting Pronouncements," for more information on the adoption of these new accounting standard updates ("ASU") issued by the Financial Accounting Standards Board.

The accompanying notes are an integral part of these consolidated financial statements.

HARMONIC INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Year ended December 31,		
	2017	2016	2015
Cash flows from operating activities:			
Net loss	\$ (82,955)	\$ (72,314)	\$ (15,661)
Adjustments to reconcile net loss to net cash provided by operating activities:			
Amortization of intangibles	8,322	14,836	6,502
Depreciation	14,599	18,819	13,241
Stock-based compensation	16,610	13,060	15,582
Amortization of discount on convertible debt	5,489	4,964	216
Provision for non-cash warrant	153	434	—
Restructuring, asset impairment and loss on retirement of fixed assets	1,906	2,305	641
Loss on impairment of long-term investment	530	2,735	2,505
Unrealized foreign exchange (gain) loss	2,369	(856)	(1,047)
Gain on pension curtailment	—	(1,955)	—
Deferred income taxes, net	2,189	(10,085)	(512)
Provision for doubtful accounts, returns and discounts	4,912	2,589	2,034
Provision for excess and obsolete inventories	6,005	6,871	1,585
Other non-cash adjustments, net	445	408	—
Changes in operating assets and liabilities, net of effects of acquisition:			
Accounts receivable	12,598	(2,563)	2,595
Inventories	11,687	(4,107)	(5,954)
Prepaid expenses and other assets	6,642	(1,892)	(8,206)
Accounts payable	3,432	5,793	4,683
Deferred revenues	(392)	18,106	(4,541)
Income taxes payable	(2,978)	(133)	(1,637)
Accrued and other liabilities	(8,499)	3,423	(5,675)
Net cash provided by operating activities	<u>3,064</u>	<u>438</u>	<u>6,351</u>
Cash flows from investing activities:			
Acquisition of business, net of cash acquired	—	(75,669)	—
Purchases of investments	—	—	(25,261)
Proceeds from maturities of investments	3,106	19,707	30,379
Proceeds from sales of investments	3,792	—	—
Purchases of property and equipment	(11,399)	(15,107)	(14,356)
Purchases of long-term investments	—	—	(85)
Decrease (increase) in restricted cash	288	591	(1,091)
Net cash used in investing activities	<u>(4,213)</u>	<u>(70,478)</u>	<u>(10,414)</u>
Cash flows from financing activities:			
Proceeds from convertible debt	—	—	128,250
Payment of convertible debt issuance cost	—	(582)	(3,527)
Proceeds from other debts	6,344	5,968	—
Repayment of other debts and capital leases	(7,408)	(8,338)	—
Proceeds from common stock issued to employees	4,716	4,444	9,222
Payment of tax withholding obligations related to net share settlements of restricted stock units	(2,757)	(1,644)	(3,549)
Payments for repurchases of common stock	—	—	(72,863)
Net cash provided by (used in) financing activities	<u>895</u>	<u>(152)</u>	<u>57,533</u>
Effect of exchange rate changes on cash and cash equivalents	1,643	(363)	(312)
Net increase (decrease) in cash and cash equivalents	1,389	(70,555)	53,158
Cash and cash equivalents at beginning of period	55,635	126,190	73,032
Cash and cash equivalents at end of period	<u>\$ 57,024</u>	<u>\$ 55,635</u>	<u>\$ 126,190</u>
Supplemental disclosures of cash flow information:			
Income tax payments (refunds), net	\$ 2,141	\$ (54)	\$ 952
Interest payments, net	5,515	5,275	—
Supplemental schedule of non-cash investing and financing activities:			
Capital expenditures incurred but not yet paid	\$ 337	\$ 394	\$ 235
Debt issuance costs incurred but not yet paid	—	—	582

The accompanying notes are an integral part of these consolidated financial statements.

HARMONIC INC.**NOTES TO CONSOLIDATED FINANCIAL STATEMENTS****NOTE 1: DESCRIPTION OF BUSINESS**

Harmonic Inc. (“Harmonic” or the “Company”) designs, manufactures and sells versatile and high performance video infrastructure products and system solutions that enable its customers to efficiently create, prepare and deliver a full range of video and broadband services to customer devices, such as televisions, personal computers, laptops, tablets and smart phones. Our products generally fall into three principal categories: video production platforms and playout solutions, video processing solutions and cable edge solutions. Harmonic also provides technical support and professional services to its customers worldwide. We sell our products and services to cable operators, broadcast and media companies, satellite and telecommunications (telco) Pay-TV service providers and streaming new media companies.

NOTE 2: SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES**Basis of Presentation**

The accompanying consolidated financial statements of Harmonic include the accounts of the Company and its wholly-owned subsidiaries. All intercompany accounts and transactions have been eliminated in consolidation. The Company’s fiscal quarters are based on 13-week periods, except for the fourth quarter which ends on December 31.

On February 29, 2016, the Company completed the acquisition of Thomson Video Networks (“TVN”) and its results of operations are included in the Company’s Consolidated Statements of Operations beginning March 1, 2016.

Use of Estimates

The preparation of consolidated financial statements in conformity with generally accepted accounting principles in the United States of America 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 consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Reclassifications

Certain prior period amounts have been reclassified to conform to the current year presentation. These reclassifications did not have material impact on previously reported total assets, total liabilities, stockholders’ equity, results of operations or cash flows.

Cash and Cash Equivalents

Cash and cash equivalents include all cash and highly liquid investments with maturities of three months or less at the date of purchase. The carrying amount of cash and cash equivalents approximates fair value because of the short maturity of those instruments.

Restricted Cash and Deposits

The Company had \$1.7 million and \$1.8 million of total restricted cash deposits, as of December 31, 2017 and 2016, respectively. These restricted cash deposits serve as collateral for certain bank guarantees and they are invested in bank deposits and cannot be withdrawn from the Company’s accounts without the prior written consent of the applicable secured party. In the Company’s Consolidated Balance Sheets, \$0.5 million and \$0.7 million of the restricted cash balances as of December 31, 2017 and 2016, respectively, were included in “Prepaid expenses and other currents”, and the remaining restricted cash balances of \$1.2 million and \$1.1 million as of December 31, 2017 and 2016, respectively, were included in “Other Long-term Assets”.

Short-Term Investments

As of December 31, 2017, the Company did not have any outstanding short-term investments. The short-term investments as of December 31, 2016 of \$6.9 million, which consisted of commercial bonds, were sold or redeemed during 2017 and the realized gain was not material. Since these available-for-sale investments were intended to support current operations, they are presented as “Current Assets” in the Consolidated Balance Sheet as of December 31, 2016.

Investments in Equity Securities

From time to time, the Company may acquire certain equity investments for the promotion of business and strategic objectives and these investments may be in marketable equity securities or non-marketable equity securities. The Company accounts for its investments in entities that it does not have significant influence under the cost method. Investments in equity securities are carried at fair value if the fair value of the security is readily determinable. Equity investments carried at fair value are classified as long-term investments and included in “Other long-term assets” in the Company’s Consolidated Balance Sheet. Unrealized gains and losses, net of taxes, on the long-term investments are included in the Company’s Consolidated Balance Sheet as a component of accumulated other comprehensive loss. Investments in equity securities that do not qualify for fair value accounting or equity method accounting are accounted for under the cost method. In accordance with the cost method, the Company’s initial investment is recorded at cost and the Company reviews all of its cost method investments quarterly to determine if impairment indicators exist. Cost method investments are classified as long-term investments and included in “Other long-term assets” in the Company’s Consolidated Balance Sheet.

The Company’s total investment in equity securities of other privately and publicly held companies, were \$3.6 million and \$4.4 million, as of December 31, 2017 and December 31, 2016, respectively.

Liquidity

As of December 31, 2017, the Company’s principal sources of liquidity consisted of cash and cash equivalents of \$57.0 million, net accounts receivable of \$69.8 million, its \$15 million line of credit with Silicon Valley Bank and financing from French government agencies. As of December 31, 2017, the Company had \$128.25 million in convertible senior notes outstanding (“Notes”), which are due on December 1, 2020. The Notes bear interest at a fixed rate of 4.00% per year, payable semiannually in arrears on June 1 and December 1 of each year. The Company also had debts with French government agencies and to a lesser extent, with other financial institutions, primarily in France, in the aggregate of \$22.9 million at December 31, 2017.

The Company’s principal uses of cash will include repayments of debt and related interest, purchases of inventory, payroll, restructuring expenses, and other operating expenses related to the development and marketing of our products, purchases of property and equipment and other contractual obligations for the foreseeable future. The Company believes that its cash and cash equivalents of \$57.0 million at December 31, 2017 will be sufficient to fund its principal uses of cash for at least the next 12 months. However, if its expectations are incorrect, it may need to raise additional funds to fund our operations, to take advantage of unanticipated strategic opportunities or to strengthen our financial position. Additional funds may not be available on terms favorable to us or at all.

Credit Risk and Major Customers/Supplier Concentration

Financial instruments which subject the Company to concentrations of credit risk consist primarily of cash, cash equivalents, short-term investments and accounts receivable. Cash, cash equivalents and short-term investments are invested in short-term, highly liquid, investment-grade obligations of commercial or governmental issuers, in accordance with the Company’s investment policy. The investment policy limits the amount of credit exposure to any one financial institution, commercial or governmental issuer.

The Company’s accounts receivable are derived from sales to worldwide cable, satellite, telco, and broadcast and media companies. The Company generally does not require collateral from its customers, and performs ongoing credit evaluations of its customers and provides for expected losses. The Company maintains an allowance for doubtful accounts based upon the expected collectability of its accounts receivable. No customers had a balance greater than 10% of the Company’s net accounts receivable balance as of December 31, 2017 and 2016. In the years ended December 31, 2017 and 2016, no customer accounted for more than 10% of the Company’s net revenue.

Certain of the components and subassemblies included in the Company’s products are obtained from a single source or a limited group of suppliers. Although the Company seeks to reduce dependence on those sole source and limited source suppliers, the partial or complete loss of certain of these sources could have at least a temporary adverse effect on the Company’s results of operations and damage customer relationships.

Revenue Recognition

The Company’s principal sources of revenue are from the sale of hardware, software, hardware and software maintenance contracts, and end-to-end solutions, encompassing design, manufacture, test, integration and installation of products. The Company also derives subscription revenues, which are comprised of subscription fees from customers utilizing the Company’s cloud-based media processing solutions. The Company recognizes revenue when persuasive evidence of an arrangement exists, delivery has occurred or services have been provided, the sale price is fixed or determinable, and collectability is reasonably assured. Subscription revenue is recognized over the subscription period as the service is delivered.

Revenue from the sale of hardware and software products is recognized when risk of loss and title have transferred. For most of the Company's product sales, these criteria are met at the time the product is shipped or delivery has occurred. Revenue from distributors and system integrators is recognized on delivery of the related products, provided all other revenue recognition criteria have been met. The Company's agreements with these distributors and system integrators have terms which are generally consistent with the standard terms and conditions for the sale of the Company's equipment to end users, and do not provide for product rotation or pricing allowances, as are typically found in agreements with stocking distributors. The Company accrues for sales returns and other allowances based on the expected customer returns at the end of each reporting period.

Deferred revenue includes billings in excess of revenue recognized and invoiced amounts remain deferred until applicable revenue recognition criteria are met.

Shipping and handling costs incurred for inventory purchases and product shipments are recorded in cost of revenue in the Company's Consolidated Statements of Operations. Costs associated with services are generally recognized as incurred.

The Company recognizes revenue from the sale of hardware products and software bundled with hardware that is essential to the functionality of the hardware in accordance with applicable revenue recognition accounting guidance. For the sale of stand-alone software products, bundled with hardware but not essential to the functionality of the hardware, revenue is allocated between the hardware, including essential software and related elements, and the non-essential software and related elements. Revenue for the hardware and essential software elements are recognized under the relative allocation method. Revenue for the non-essential software and related elements are recognized under the residual method in accordance with software accounting guidance. Revenue associated with service and maintenance agreements is recognized on a straight-line basis over the period in which the services are performed, generally one year. Further details of these accounting policies are described below.

Multiple Element Arrangements. The Company has revenue arrangements that include hardware and software essential to the hardware product's functionality, and non-essential software, services and support. The Company allocates revenue to all deliverables based on their relative selling prices. The Company determines the relative selling prices by first considering vendor-specific objective evidence of fair value ("VSOE"), if it exists; otherwise third-party evidence ("TPE") of the selling price is used. If neither VSOE nor TPE exists for a deliverable, the Company uses a best estimate of the selling price ("BESP") for that deliverable. Once revenue is allocated to all deliverables based on their relative selling prices, revenue related to hardware elements (hardware, essential software and related services) are recognized using a relative selling price allocation and non-essential software and related services are recognized under the residual method.

The Company has established VSOE for certain elements of its arrangements based on either historical stand-alone sales to third parties or stated renewal rates for maintenance. The Company has VSOE of fair value for maintenance, training and certain professional services.

TPE is determined based on competitor prices for similar deliverables when sold separately. The Company is typically not able to determine TPE for competitors' products or services. Generally, the Company's go-to-market strategy differs from that of its competitors' and the Company's offerings contain a significant level of differentiation, such that the comparable pricing of products with similar functionality cannot be obtained. Furthermore, the Company is unable to reliably determine what competitor similar products' selling prices are on a stand-alone basis.

When the Company is unable to establish fair value of non-software deliverables using VSOE or TPE, the Company uses BESP in its allocation of arrangement consideration. The objective of using BESP is to determine the price at which the Company would transact a sale if the product or service were sold on a stand-alone basis. The Company determines BESP for a product or service by considering multiple factors, including, but not limited to, pricing practices, market conditions, competitive landscape, internal costs, geographies and gross margin. The determination of BESP is made through consultation with Company's management, taking into consideration the Company's go-to-market strategy.

Software. Sales of stand-alone software that are not considered essential to the functionality of the hardware continue to be subject to the software revenue recognition guidance.

In accordance with the software revenue recognition guidance, the Company applies the residual method to recognize revenue for the delivered elements in stand-alone software transactions. Under the residual method, the amount of revenue allocated to delivered elements equals the total arrangement consideration, less the aggregate fair value of any undelivered elements, typically maintenance, provided that VSOE of fair value exists for all undelivered elements. VSOE of fair value is based on the price charged when the element is sold separately or, in the case of maintenance, VSOE may be based on substantive renewal rates.

Solution Sales. Solution sales for the design, manufacture, test, integration and installation of products, including equipment acquired from third parties to be integrated with Harmonic's products, that are customized to meet the customer's specifications are accounted for in accordance with applicable guidance on accounting for performance of construction/production contracts. Accordingly, for each arrangement that the Company enters into that includes both products and services, the Company performs a detailed evaluation to determine whether the arrangement should be accounted for under guidance for construction/production contracts or, alternatively, for arrangements that do not involve significant production, modification or customization, under other applicable accounting guidance. The Company has a long-standing history of entering into contractual arrangements to deliver the solution sales described.

Inventories

Inventories are stated at the lower of cost or net realizable value. Cost is computed using standard cost, which approximates actual cost, on a first-in, first-out basis. The cost of inventories is comprised of material, labor and manufacturing overhead. The Company's manufacturing overhead standards for product costs are calculated assuming full absorption of forecasted spending over projected volumes. The Company establishes provisions for excess and obsolete inventories to reduce such inventories to their estimated net realizable value after evaluation of historical sales, future demand and market conditions, expected product life cycles and current inventory levels. Such provisions are charged to cost of revenue in the Company's Consolidated Statements of Operations.

Capitalized Software Development Costs

External-use software. Research and development costs are generally charged to expense as incurred. The Company has not capitalized any such development costs because the costs incurred between the attainment of technological feasibility for the related software product through the date when the product is available for general release to customers has been insignificant.

Internal-use software. The Company capitalizes costs associated with internally developed and/or purchased software systems for internal use that have reached the application development stage. Capitalized costs include external direct costs of materials and services utilized in developing or obtaining internal-use software and payroll and payroll-related expenses for employees who are directly associated with and devote time to the internal-use software project. Capitalization of such costs begins when the preliminary project stage is complete and ceases no later than the point at which the project is substantially complete and ready for its intended purpose. These capitalized costs are amortized on a straight-line basis, generally three years.

During the year ended December 31, 2017, the Company capitalized \$1.1 million of its software development costs related to the development of its VOS Cloud and VOS 360 SaaS offerings. In the years ended December 31, 2016 and 2015, research and development costs capitalized for internal use software were not significant.

Property and Equipment

Property and equipment are recorded at cost. Depreciation and amortization are computed using the straight-line method over the estimated useful lives of the assets. Estimated useful lives are generally, five years for furniture and fixtures, three years for software and four years for machinery and equipment. Depreciation and amortization for leasehold improvements are computed using the shorter of the remaining useful lives of the assets, up to 10 years, or the lease term of the respective assets.

Business Combination

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 assets acquired and the liabilities assumed. Determining the fair value of assets acquired and liabilities assumed requires management's judgment and often involves the use of significant estimates and assumptions, including assumptions with respect to future cash inflows and outflows, discount rates, intangibles and other asset lives, among other items. Fair value is defined as the price that would be received in a sale of an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price). Market participants are assumed to be buyers and sellers in the principal (most advantageous) market for the asset or liability. Additionally, fair value measurements for an asset assume the highest and best use of that asset by market participants. As a result, the Company may have been required to value the acquired assets at fair value measurements that do not reflect its intended use of those assets. Use of different estimates and judgments could yield different results. Any excess of the purchase price over the fair value of the net assets acquired is recognized as goodwill.

Goodwill

As of December 31, 2017, the Company had goodwill of \$242.8 million which represents the difference between the purchase price and the estimated fair value of the identifiable assets acquired and liabilities assumed. The Company tests for goodwill impairment at the reporting unit level on an annual basis in the fourth quarter of each of its fiscal years, and at any other time at which events occur or circumstances indicate that the carrying amount of goodwill may exceed its fair value. The Company uses a two-step process to determine the amount of goodwill impairment. The first step requires comparing the fair value of the reporting unit to its net book value, including goodwill. A potential impairment exists if the fair value of the reporting unit is lower than its net book value. The second step of the process, which is performed only if a potential impairment exists, involves determining the difference between the fair value of the reporting unit's net assets, other than goodwill, and the fair value of the reporting unit. If this difference is less than the net book value of goodwill, an impairment exists and is recorded.

The Company has two reporting units, which are the same as its operating segments. Goodwill is assigned to the reporting units using the relative fair values of the reporting units and the fair values of the reporting units were determined utilizing a blend of the income approach and the market approach. There was no impairment of goodwill resulting from the Company's fiscal 2017 annual impairment testing in the fourth quarter of 2017. (See Note 7, "Goodwill and Identified Intangible Assets," for additional information).

Long-lived Assets

Long-lived assets represent property and equipment and purchased intangible assets. Purchased intangible assets from business combinations and asset acquisitions include customer contracts, trademarks and trade names, and maintenance agreements and related relationships, the amortization of which is charged to general and administrative expenses, and core technology and developed technology, the amortization of which is charged to cost of revenue. The Company evaluates the recoverability of intangible assets and other long-lived assets when indicators of impairment are present. When impairment indicators are present, the Company evaluates the recoverability of intangible assets and other long-lived assets on the basis of undiscounted cash flows expected to result from the use of each asset group and its eventual disposition. If the undiscounted expected future cash flows are less than the carrying amount of the asset, an impairment loss is recognized in order to write down the carrying value of the asset to its estimated fair market value. There were no impairment charges for long-lived assets in the years ended December 31, 2017, 2016 and 2015.

Foreign Currency

The functional currency of the Company's Israeli, Cayman and Swiss operations is the U.S. dollar. All other foreign subsidiaries use the respective local currency as the functional currency. When the local currency is the functional currency, gains and losses from translation of these foreign currency financial statements into U.S. dollars are recorded as a separate component of other comprehensive loss in stockholders' equity.

The Company's foreign currency exposure is also related to its net position of monetary assets and monetary liabilities held by its subsidiaries in their nonfunctional currencies. These monetary assets and monetary liabilities are being remeasured into the functional currencies of the subsidiaries using exchange rates prevailing on the balance sheet date. Such remeasurement gains and losses are included in other expense, net in the Company's Consolidated Statements of Operations. During the years ended December 31, 2017, 2016 and 2015, the Company recorded remeasurement losses of \$2.2 million, \$0.2 million and \$0.5 million, respectively.

Derivative Instruments

The Company enters into derivative instruments, primarily foreign currency forward contracts, to minimize the short-term impact of foreign currency exchange rate fluctuations on certain foreign currency denominated assets and liabilities as well as certain foreign currencies denominated expenses. The Company does not enter into derivative instruments for trading purposes and these derivatives generally have maturities within twelve months.

The derivative instruments are recorded at fair value in prepaid expenses and other current assets or accrued and other current liabilities in the Company's Consolidated Balance Sheet. For derivative instruments designated and qualifying as cash flow hedges of forecasted foreign currency denominated transactions expected to occur within twelve months, the effective portion of the gain or loss on these hedges is reported as a component of "Accumulated other comprehensive loss" in stockholders' equity, and is reclassified into earnings when the hedged transaction affects earnings. If the transaction being hedged fails to occur, or if a portion of any derivative is (or becomes) ineffective, the gain or loss on the associated financial instrument is recorded immediately in earnings. For derivative instruments used to hedge existing foreign currency denominated assets or liabilities, the gains or losses on these hedges are recorded immediately in earnings to offset the changes in the fair value of the assets or liabilities being hedged.

The Company did not enter into any cash flow hedges during the year ended December 31, 2017.

Research and Development

Research and development (“R&D”) costs are expensed as incurred and consists primarily of employee salaries and related expenses, contractors and outside consultants, supplies and materials, equipment depreciation and facilities costs, all associated with the design and development of new products and enhancements of existing products. R&D expense was \$96.0 million, \$98.4 million and \$87.5 million for the years ended December 31, 2017, 2016 and 2015, respectively.

R&D expense was net of \$6.0 million of reimbursements from one of our large customers in each of the years ended December 31, 2017 and 2016. The Company’s TVN French Subsidiary participates in the French Crédit d’Impôt Recherche (“CIR”) program which allows companies to monetize eligible research expenses. The R&D tax credits receivable from the French government for spending on innovative R&D under the CIR program is recorded as an offset to R&D expenses. In the years ended December 31, 2017 and 2016, the R&D expenses were net of \$5.9 million and \$6.1 million of R&D tax credits, respectively. There were no such reimbursement from customers or R&D tax credits in the year ended December 31, 2015.

Restructuring and Related Charges

The Company’s restructuring charges consist primarily of employee severance, one-time termination benefits related to the reduction of its workforce, lease exit costs, and other costs. Liabilities for costs associated with a restructuring activity are recognized when the liability is incurred and are measured at fair value. One-time termination benefits are expensed at the date the entity notifies the employee, unless the employee must provide future service, in which case the benefits are expensed ratably over the future service period. Termination benefits are calculated based on regional benefit practices and local statutory requirements. Costs to terminate a lease before the end of its term are recognized when the entity terminates the contract in accordance with the contract terms. The Company determines the excess facilities accrual based on expected cash payments, under the applicable facility lease, reduced by any estimated sublease rental income for such facility. (See Note 10, “Restructuring and related Charges” for additional information).

Warranty

The Company accrues for estimated warranty costs at the time of revenue recognition and records such accrued liabilities as part of cost of revenue. Management periodically reviews its warranty liability and adjusts the accrued liability based on the terms of warranties provided to customers, historical and anticipated warranty claims experience, and estimates of the timing and cost of warranty claims.

Advertising Expenses

All advertising costs are expensed as incurred and included in “Selling, general and administrative expenses” in the Company’s Consolidated Statements of Operations. Advertising expense was \$0.7 million, \$1.4 million and \$1.4 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Stock-based Compensation Expense

The Company measures and recognizes compensation expense for all stock-based compensation awards made to employees and non-employee directors, including stock options, restricted stock units (“RSUs”) and awards related to the Company’s Employee Stock Purchase Plan (“ESPP”), based upon the grant-date fair value of those awards.

Prior to January 1, 2017, stock-based compensation expense was recorded net of estimated forfeitures over the requisite service period and, accordingly, was recorded for only those stock-based awards that the Company expected to vest. Upon the adoption of the Accounting Standard Update No. 2016-09, Compensation - Stock Compensation (Topic 718), issued by the Financial Accounting Standards Board. The Company changed its accounting policy to account for forfeitures as they occur. The change was applied on a modified retrospective approach with a cumulative effect adjustment of \$69,000 to retained earnings as of January 1, 2017 (which increased the accumulated deficit).

The fair value of the Company’s stock options and ESPP is estimated at grant date using the Black-Scholes option pricing model. The fair value of the Company’s RSUs is calculated based on the fair market value of the Company’s stock at the grant date. The fair value of the Company’s market-based RSUs is estimated using the Monte-Carlo valuation model with market vesting conditions.

The Company recognizes the stock-based compensation expense for performance-based RSUs (“PRSUs”) based on the probability of achieving certain performance criteria, as defined in the PRSU agreements. The Company estimates the number of PRSUs ultimately expected to vest and recognizes expense using the graded vesting attribution method over the requisite service period. Changes in the estimates related to probability of achieving certain performance criteria and number of PRSUs expected to vest could significantly affect the stock-based compensation expense from one period to the next.

Pension Plan

Under French law, the Company's subsidiaries in France, including the acquired TVN French Subsidiary, is obligated to provide for a defined benefit plan to its employees upon their retirement from the Company. The Company's defined benefit pension plan in France is unfunded.

The Company records annual amounts relating to the pension plans based on calculations which include various actuarial assumptions including employees' age and period of service with the company; projected mortality rates, mobility rates and increases in salaries; and a discount rate. The Company reviews its actuarial assumptions on an annual basis as of December 31 (or more frequently if a significant event requiring remeasurement occurs) and modifies the assumptions based on current rates and trends when it is appropriate to do so. The Company believes that the assumptions utilized in recording its obligations under its pension plan are reasonable based on its experience, market conditions and input from its actuaries.

The Company accounts for the actuarial gains (losses) in accordance with ASC 715, "Compensation - Retirement Benefits". If the net accumulated gain or loss exceeds 10% of the projected plan benefit obligation a portion of the net gain or loss is amortized and included in expense for the following year based upon the average remaining service period of active plan participants, unless the Company's policy is to recognize all actuarial gains (losses) when they occur. The Company elected to defer actuarial gains (losses) in accumulated other comprehensive loss. As of December 31, 2017, the Company did not meet the 10% requirement, and therefore no amortization of 2017 actuarial gain would be recorded in 2018.

See Note 12, "Employee Benefit Plans and Stock-based Compensation-French Retirement Benefit Plan," for additional information.

Income Taxes

In preparing the Company's financial statements, the Company estimates the income taxes for each of the jurisdictions in which the Company operates. This involves estimating the Company's actual current tax exposures and assessing temporary and permanent differences resulting from differing treatment of items, such as reserves and accruals, for tax and accounting purposes. These differences result in deferred tax assets and liabilities, which are included within the Company's Consolidated Balance Sheet.

The Company's income tax policy is to record the estimated future tax effects of temporary differences between the tax bases of assets and liabilities and amounts reported in the Company's accompanying Consolidated Balance Sheets, as well as operating loss and tax credit carryforwards. The Company follows the guidelines set forth in the applicable accounting guidance regarding the recoverability of any tax assets recorded on the Consolidated Balance Sheet and provides any necessary allowances as required. Determining necessary allowances requires the Company to make assessments about the timing of future events, including the probability of expected future taxable income and available tax planning opportunities. A history of operating losses in recent years has led to uncertainty with respect to our ability to realize certain of our net deferred tax assets, and as a result we applied full valuation allowance against our U.S. net deferred tax assets as of December 31, 2017. In the event that actual results differ from these estimates or the Company adjusts these estimates in future periods, the Company's operating results and financial position could be materially affected.

The Company is subject to examination of its income tax returns by various tax authorities on a periodic basis. The Company regularly assesses the likelihood of adverse outcomes resulting from such examinations to determine the adequacy of its provision for income taxes. The Company has applied the provisions of the applicable accounting guidance on accounting for uncertainty in income taxes, which requires application of a more-likely-than-not threshold to the recognition and de-recognition of uncertain tax positions. If the recognition threshold is met, the applicable accounting guidance permits the Company to recognize a tax benefit measured at the largest amount of tax benefit that, in the Company's judgment, is more than 50% likely to be realized upon settlement. It further requires that a change in judgment related to the expected ultimate resolution of uncertain tax positions be recognized in earnings in the period of such change.

The Company files annual income tax returns in multiple taxing jurisdictions around the world. A number of years may elapse before an uncertain tax position is audited and finally resolved. While it is often difficult to predict the final outcome or the timing of resolution of any particular uncertain tax position, the Company believes that its reserves for income taxes reflect the most likely outcome. The Company adjusts these reserves and penalties, as well as the related interest, in light of changing facts and circumstances. Changes in the Company's assessment of its uncertain tax positions or settlement of any particular position could materially and adversely impact the Company's income tax rate, operating results, financial position and cash flows.

Sales Taxes

The Company accounts for sales taxes imposed on its goods and services and collected from customers on a net basis in the Consolidated Statements of Operations.

Segment Reporting

Operating segments are defined as components of an enterprise that engage in business activities for which separate financial information is available and is evaluated by the Chief Operating Decision Maker (“CODM”), which for the Company is its Chief Executive Officer, in deciding how to allocate resources and assess performance. The Company has two operating segments: Video and Cable Edge.

Comprehensive Income (Loss)

Comprehensive income (loss) includes net income (loss) and other comprehensive income (loss). Other comprehensive income (loss) includes cumulative translation adjustments, unrealized foreign exchange gains and losses on intercompany long-term loans, unrealized gains and losses on certain foreign currency forward contracts that qualify as cash flow hedges and available-for-sale securities, as well as actuarial gains and losses on pension plan.

Recent Accounting Pronouncements

New Standards to be Implemented

In May 2014, Financial Accounting Standards Board (“FASB”) issued a new Accounting Standards Update (“ASU”) No. 2014-09, Revenue from Contracts with Customers, as amended, which will supersede nearly all existing revenue recognition guidance. Under ASU 2014-09, an entity is required to recognize revenue upon transfer of promised goods or services to customers in an amount that reflects the expected consideration received in exchange for those goods or services. ASU No. 2014-09 defines a five-step process in order to achieve this core principle, which may require the use of judgment and estimates, and also requires expanded qualitative and quantitative disclosures relating to the nature, amount, timing and uncertainty of revenue and cash flows arising from contracts with customers, including significant judgments and estimates used.

The FASB has issued several amendments to the new standard, including clarification on accounting for licenses of intellectual property and identifying performance obligations. The amendments include ASU No. 2016-08, Revenue from Contracts with Customers (Topic 606)-Principal versus Agent Considerations, which was issued in March 2016, and clarifies the implementation guidance for principal versus agent considerations in ASU 2014-09, and ASU No. 2016-10, Revenue from Contracts with Customers (Topic 606)-Identifying Performance Obligations and Licensing, which was issued in April 2016, and amends the guidance in ASU No. 2014-09 related to identifying performance obligations and accounting for licenses of intellectual property.

The new standard permits adoption either by using (i) a full retrospective approach for all periods presented in the period of adoption or (ii) a modified retrospective approach with the cumulative effect of initially applying the new standard recognized at the date of initial application and providing certain additional disclosures. The new standard is effective for annual reporting periods beginning after December 15, 2017, with early adoption permitted for annual reporting periods beginning after December 15, 2016. The Company will adopt the new standard effective January 1, 2018.

The Company plans to adopt using the modified retrospective approach. The Company currently believes that there will be changes to the timing of recognition of software licenses with undelivered features and professional services revenue related to service contracts with acceptance terms. Under current industry-specific software revenue recognition guidance, the Company has historically concluded that it did not have vendor-specific objective evidence (“VSOE”) of fair value of the undelivered features relating to delivered software licenses, and accordingly, it has deferred entire revenue for such software licenses until the delivery of features. Professional services included in arrangements with acceptances have also been recognized on receipt of acceptance. The new standard, which does not retain the concept of VSOE, requires an evaluation of whether the undelivered features are distinct performance obligations and, therefore, should be separately recognized when delivered compared to the timing of delivery of software licenses. Professional services will generally be recorded as services are provided. As a result, the timing of when revenue is recognized is expected to be earlier for future features and professional services under the new standard.

The revenue allocated to hardware and services (including professional services) will also likely change due to the change in contingent revenue rules under the new standard.

The Company has substantially completed its evaluation of the impact of the new standard on its accounting policies, processes, and system requirements. However, due to the modified retrospective method's requirement to quantify the impact of the changes on open contracts as of December 31, 2017, and the implementation of revenue system changes and the volume of the required data analysis, the Company is finalizing its assessments, including the transition adjustment for open contracts and expects to complete that before the Q1, 2018 10Q filing.

As part of the Company's evaluation, it has also considered the impact of the guidance in Accounting Standards Codification ("ASC") 340-40, Other Assets and Deferred Costs; Contracts with Customers, and the interpretations of the FASB Transition Resource Group for Revenue Recognition ("TRG") from their November 7, 2016 meeting with respect to capitalization and amortization of incremental costs of obtaining a contract. The Company does not expect this standard to have a significant impact on the accounting for costs to obtain the contract. Under the Company's current accounting policy, it expenses the commission costs as incurred.

In January 2016, the FASB issued ASU No. 2016-01, Financial Instruments (Topic 825): Recognition and Measurement of Financial Assets and Financial Liabilities, which requires equity investments to be measured at fair value with changes in fair value recognized in net income and simplifies the impairment assessment of equity investments without readily determinable fair values by requiring a qualitative assessment to identify impairment. This ASU will be effective for the Company beginning in the first quarter of fiscal 2018. The Company only has one available-for-sale equity investment, Vislink plc, which was fully written off as of December 31, 2017 and the Company only has one cost method equity investment, EDC, which will be subject to this new ASU. The adoption of this new ASU is not expected to have a material impact on the Company's consolidated financial statements. (See note 3, "Investments in Other Equity Securities," for more information on Vislink and EDC).

In February 2016, the FASB issued ASU No. 2016-02 Leases (Topic 842), to amend the existing accounting standard for lease accounting. Under this guidance, lessees and lessors should apply a "right-of-use" model in accounting for all leases (including subleases) and eliminate the concept of operating leases and off-balance sheet leases. This new leases standard requires a modified retrospective transition approach for all leases existing at, or entered into after, the date of initial application, with an option to use certain transition relief. This new ASU will be effective for the Company beginning in the first quarter of fiscal 2019 and early adoption is permitted. The Company is currently evaluating the methods and impact of adopting the new ASU on its consolidated financial statements.

In June 2016, the FASB issued ASU No. 2016-13, Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments, which changes the impairment model for most financial assets and certain other instruments. For trade receivables and other instruments, the Company will be required to use a new forward-looking "expected loss" model. Additionally, credit losses on available-for-sale debt securities should be recorded through an allowance for credit losses limited to the amount by which fair value is below amortized cost. This new ASU will be effective for the Company beginning in the first quarter of fiscal 2020 and early adoption is permitted. The Company is currently evaluating the impact of adopting this new ASU on its consolidated financial statements.

In November 2016, the FASB issued ASU No. 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash, which requires entities to present the aggregate changes in cash, cash equivalents, restricted cash and restricted cash equivalents in the statement of cash flows. As a result, the statement of cash flows will be required to present restricted cash and restricted cash equivalents as a part of the beginning and ending balances of cash and cash equivalents. The new ASU will be effective for the Company beginning in the first quarter of fiscal 2018 on a retrospective basis. The Company's total restricted cash balances was \$1.7 million, \$1.8 million and \$1.1 million, as of December 31, 2017, 2016, and 2015, respectively, and accordingly, these balances will be presented as a part of the beginning and ending balances of cash and cash equivalents for the preparation of the Company's Consolidated Statements of Cash Flows for the corresponding periods.

In January 2017, the FASB issued ASU No. 2017-04, Intangibles - Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment. This new ASU removes Step 2 of the goodwill impairment test and requires the assessment of fair value of individual assets and liabilities of a reporting unit to measure goodwill impairments. Goodwill impairment will then be the amount by which a reporting unit's carrying value exceeds its fair value. This new ASU will be effective for the Company beginning in the first quarter of fiscal 2020 on a prospective basis, and early adoption is permitted. The Company is currently evaluating the impact of adopting this new ASU on its consolidated financial statements.

In January 2017, the FASB issued ASU 2017-01, "Business Combinations (Topic 805): Clarifying the Definition of a Business". The objective of ASU 2017-01 is to clarify the definition of a business in order to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. The definition of a business affects many areas of accounting including acquisitions, disposals, goodwill and consolidation. ASU 2017-01 is effective for

the Company beginning in the first quarter of fiscal 2018. This new ASU is not expected to have a material impact on the Company's consolidated financial statements.

Standards Implemented

In March 2016, the FASB issued ASU No. 2016-07, Investments- Equity Method and Joint Ventures: Simplifying the Transition to the Equity Method of Accounting. This guidance eliminates the requirement to retroactively adopt the equity method of accounting when an investment qualifies for using the equity method due to an increase in the level of ownership interest or degree of influence. In that situation, the ASU requires an investor to apply the equity method only on a go-forward basis. Under this new ASU, an investor that has an available-for-sale security that subsequently qualifies for the equity method will recognize in net income the unrealized holding gains or losses in accumulated other comprehensive income related to that security when it begins applying the equity method. The Company adopted this new ASU beginning in the first quarter of fiscal 2017 and it did not have any impact to the Company's 2017 consolidated financial statements because none of its equity investments qualify for equity method of accounting during 2017.

In March 2016, the FASB issued ASU No. 2016-09, Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting, for the accounting of share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities and classification on the statement of cash flows. The new standard eliminated the requirement to report excess tax benefits and certain tax deficiencies related to share-based payment transactions as additional paid-in capital. It also removes the requirement to delay recognition of a windfall tax benefit until it reduces current taxes payable. Under the new guidance, the benefit will be recorded when it arises, subject to normal valuation allowance considerations. The Company adopted this new ASU beginning in the first quarter of fiscal 2017 using a modified-retrospective transition method and recorded a cumulative effect of \$4.6 million of additional gross deferred tax asset associated with share-based payment and an offsetting valuation allowance of the same amount, therefore resulting in no net impact to the Company's beginning retained earnings. Prior to January 1, 2017, stock-based compensation expense was recorded net of estimated forfeitures in the Company's Consolidated Statements of Operations and, accordingly, was recorded for only those stock-based awards that the Company expected to vest. Upon the adoption of this ASU, effective January 1, 2017, the Company changed its accounting policy to account for forfeitures as they occur. The change was applied on a modified retrospective approach with a cumulative effect adjustment of \$69,000 to retained earnings as of January 1, 2017 (which increased the accumulated deficit). The implementation of this ASU has no impact to the Company's Consolidated Statement of Cash Flows because the Company does not have any excess tax benefits from share-based compensation because its tax provision is primarily under full valuation allowance. In addition, the Company has historically been reporting excess tax benefits as an operating activity in the Company's Consolidated Statement of Cash Flows, therefore, no prior periods were recast as a result of this change in accounting policy.

In October 2016, the FASB issued ASU No. 2016-16, Income Taxes (topic 740): Intra-Entity Transfers of Assets Other Than Inventory, which requires companies to recognize the income tax consequences of all intra-entity sales of assets other than inventory when they occur. As a result, a reporting entity would recognize the tax expense from the sale of the asset in the seller's tax jurisdiction when the transfer occurs, even though the pre-tax effects of that transaction are eliminated in consolidation. Any deferred tax asset that arises in the buyer's jurisdiction would also be recognized at the time of the transfer. The Company early adopted this ASU during the first quarter of fiscal 2017 on a modified retrospective approach and recorded a cumulative-effect adjustment of \$1.4 million to the retained earnings as of January 1, 2017 (which reduced the accumulated deficit). Correspondingly, in the first quarter of fiscal 2017, the Company recognized an additional \$1.1 million of net deferred tax assets, after netting with \$2.1 million of valuation allowance, and write off the remaining \$0.3 million of unamortized tax expenses deferred under the previous guidance to provision for income taxes in the first quarter of fiscal 2017.

NOTE 3: INVESTMENTS IN OTHER EQUITY SECURITIES

Vislink

In 2014, the Company acquired a 3.3% interest in Vislink plc ("Vislink"), a U.K. public company listed on the AIM exchange, for \$3.3 million. The investment in Vislink is being accounted for as a cost method investment as the Company does not have significant influence over the operational and financial policies of Vislink. Since the Vislink investment is also an available-for-sale security, its value is marked to market for the difference in fair value at period end. The accumulated unrealized gain (loss) arising from the change in Vislink's fair value for each reporting period is included in the Consolidated Balance Sheet as a component of "Accumulated other comprehensive loss (AOCI)".

Since mid-2016, Vislink's stock price has traded below its cost basis since mid-2016. The Company assessed this available-for-sale investment on an individual basis to determine if the decline in fair value was other than temporary. The assessment as to the nature of a decline in fair value is based on, among other things, the length of time and the extent to which

the market value has been less than the Company's cost basis; the financial condition and near-term prospects of the investment; and the Company's intent and ability to retain the investment for a period of time sufficient to allow for any anticipated recovery in market value. As a result of these assessments, impairment charges of \$1.5 million and \$1.2 million were recognized in the first and third quarter of 2016, respectively, reflecting new reduced cost basis at September 30, 2016. In the fourth quarter of 2016, Vislink's stock price recovered 67% from September 30, 2016, and the carrying value as of December 31, 2016 was \$0.8 million. Vislinks accumulated unrealized gain recorded in AOIC was \$0.3 million at December 31, 2016.

On February 3, 2017, Vislink (from thereon, referred to as Pebble Beach Systems) completed the disposal of its hardware division and changed its name to Pebble Beach Systems. On February 6, 2017, Pebble Beach Systems announced its financial results for fiscal 2016 which showed a significant increase in operating losses and at the same time Pebble Beach Systems announced the consideration to sell the company. Since February 2017, Pebble Beach Systems' stock price began to decline to below the Company's reduced cost basis. In view of Pebble Beach Systems' potential sale opportunity, the Company determined that the decline in the fair value of Pebble Beach Systems' investment in the first nine months of 2017 was not considered permanent yet. However, in the fourth quarter of 2017, Pebble Beach announced that it had withdrawn from the sale process due to a lack of viable offers and that it would work on refinancing their debts and revising the bank covenants to improve its liquidity. Based on Pebble Beach Systems' fourth quarter announcement, without the sale opportunity and its highly leveraged financial conditions, the Company believes that it is more-likely-than-not that Pebble Beach Systems' investment is recoverable. As a result, during the fourth quarter of 2017, the Company wrote off the remaining carrying value and released all the balances in the AOCI to earnings, resulting in an impairment charge of \$0.5 million in the fourth quarter of 2017.

Unconsolidated Variable Interest Entities ("VIE")

From time to time, the Company may enter into investments in entities that are considered variable interest entities under Accounting Standards Codification (ASC) Topic 810. If the Company is the primary beneficiary of a variable interest entity ("VIE"), it is required to consolidate it. To determine if the Company is the primary beneficiary of a VIE, the Company evaluates whether it has (1) the power to direct the activities that most significantly impact the VIE's economic performance, and (2) the obligation to absorb losses or the right to receive benefits from the VIE that could potentially be significant to the VIE. The assessment of whether the Company is the primary beneficiary of its VIE requires significant assumptions and judgments.

EDC

In 2014, the Company acquired an 18.4% interest in Encoding.com, Inc. ("EDC"), a video transcoding service company headquartered in San Francisco, California, for \$3.5 million by purchasing EDC's Series B preferred stock. EDC is considered a VIE but the Company determined that it is not the primary beneficiary of EDC. As a result, EDC is accounted for as a cost method investment.

The Company determined that there were no indicators existing at December 31, 2017 that would indicate that the EDC investment was impaired. The Company's maximum exposure to loss from the EDC's investment at December 31, 2017 was limited to its investment cost of \$3.6 million, including \$0.1 million of transaction costs.

VJU

In 2014, the Company acquired a 19.8% interest in VJU ITV Development GmbH ("VJU"), a software company based in Austria, for \$2.5 million. In March 2015, at the VJU board meeting, the Company was made aware of significant decreases in VJU's business prospects, VJU's existing working capital and prospects for additional funding. Based on the Company's assessment, of VJU's expected cash flows, the entire investment is expected to be non-recoverable. As a result, the Company recorded an impairment charge of \$2.5 million in the first quarter of 2015. The VJU investment was sold for \$6,000 in the fourth quarter of 2017.

NOTE 4: DERIVATIVES AND HEDGING ACTIVITIES

Derivatives Not Designated as Hedging Instruments (Balance Sheet Hedges)

The Company's balance sheet hedges consist of foreign currency forward contracts which mature generally within three months. These forward contracts are carried at fair value and they are used to minimize the short-term impact of foreign currency exchange rate fluctuation on cash and certain trade and inter-company receivables and payables. Changes in the fair value of these foreign currency forward contracts are recognized in "Other expense, net" in the Consolidated Statement of Operations and are largely offset by the changes in the fair value of the assets or liabilities being hedged.

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The locations and amounts of designated and non-designated derivative instruments' gains and losses reported in the Company's AOCI and Consolidated Statements of Operations are as follows (in thousands):

	Financial Statement Location	Year ended December 31,		
		2017	2016	2015
Derivatives not designated as hedging instruments:				
Gains recognized in income	Other income (expense), net	\$ 155	\$ 343	\$ 344
Derivatives designated as hedging instruments ⁽¹⁾:				
Gains (losses) in AOCI on derivatives (effective portion)	AOCI	\$ —	\$ 202	\$ (133)
Gains (losses) reclassified from AOCI into income (effective portion)	Cost of Revenue	\$ —	\$ (6)	\$ 59
	Operating Expense	—	(38)	365
	Total	\$ —	\$ (44)	\$ 424
(Losses) recognized in income on derivatives (ineffectiveness portion and amount excluded from effectiveness testing)	Other income (expense), net	\$ —	\$ (63)	\$ (87)

(1) The Company did not enter into any new cash flow hedge contracts since December 31, 2016.

The U.S. dollar equivalents of all outstanding notional amounts of foreign currency forward contracts are summarized as follows (in thousands):

	December 31,	
	2017	2016
Derivatives not designated as hedging instruments:		
Purchase	\$ 12,875	\$ 4,056
Sell	\$ 1,509	\$ 11,157

The locations and fair value amounts of the Company's derivative instruments reported in its Consolidated Balance Sheets are as follows (in thousands):

	Balance Sheet Location	Asset Derivatives		Balance Sheet Location	Liability Derivatives	
		December 31, 2017	December 31, 2016		December 31, 2017	December 31, 2016
Derivatives not designated as hedging instruments:						
Foreign currency contracts	Prepaid expenses and other current assets	\$ 33	\$ 54	Accrued and other current Liabilities	\$ 4	\$ 40
		\$ 33	\$ 54		\$ 4	\$ 40

Offsetting of Derivative Assets and Liabilities

The Company recognizes all derivative instruments on a gross basis in the Consolidated Balance Sheets. However, the arrangements with its counterparties allows for net settlement, which are designed to reduce credit risk by permitting net settlement with the same counterparty. As of December 31, 2017, information related to the offsetting arrangements was as follows (in thousands):

			Gross Amounts of Derivatives Not Offset in the Consolidated Balance Sheets			
	Gross Amounts of Derivatives	Gross Amounts of Derivatives Offset in the Consolidated Balance Sheets	Net Amounts of Derivatives Presented in the Consolidated Balance Sheets	Financial Instrument	Cash Collateral Pledged	Net Amount
Derivative Assets	\$ 33	\$ —	\$ 33	\$ (4)	\$ —	\$ 29
Derivative Liabilities	\$ 4	\$ —	\$ 4	\$ (4)	\$ —	\$ —

In connection with the foreign currency derivatives entered in Israel, the Company's subsidiaries in Israel are required to maintain a compensating balance with their bank at the end of each month. These compensating balance arrangements do not legally restrict the use of cash. As of December 31, 2017, the total compensating balance maintained was \$1.0 million.

NOTE 5: FAIR VALUE MEASUREMENTS

The applicable accounting guidance establishes a framework for measuring fair value and requires disclosure about the fair value measurements of assets and liabilities. This guidance requires the Company to classify and disclose assets and liabilities measured at fair value on a recurring basis, as well as fair value measurements of assets and liabilities measured on a nonrecurring basis in periods subsequent to initial measurement, in a three-tier fair value hierarchy as described below.

The guidance defines fair value as the exchange price that would be received for an asset or paid to transfer a liability, in the principal or most advantageous market for the asset or liability, in an orderly transaction between market participants on the measurement date.

Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. The guidance describes three levels of inputs that may be used to measure fair value:

- Level 1 — Observable inputs that reflect quoted prices for identical assets or liabilities in active markets.
- Level 2 — Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities. The Company primarily uses broker quotes for valuation of its short-term investments. The forward exchange contracts are classified as Level 2 because they are valued using quoted market prices and other observable data for similar instruments in an active market.
- Level 3 — Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

The carrying value of the Company's financial instruments, including cash equivalents, restricted cash, short-term investments, accounts receivable, accounts payable and accrued and other current liabilities, approximate fair value due to their short maturities.

The Company uses the market approach to measure fair value for its financial assets and liabilities. The market approach uses prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities. The fair value of the Company's convertible notes is influenced by interest rates, the Company's stock price and stock market volatility. The fair values of the Company's convertible notes as of December 31, 2017 and 2016 was \$129.9 million and \$143.5 million, based on the bond's quoted market price as of December 31, 2017 and 2016, respectively, and represents a Level 2 valuation. The Company's other debts assumed from the TVN acquisition are classified within Level 2 because these borrowings are not actively traded and the majority of them have a variable interest rate structure based upon market rates currently available to the Company for debt with similar terms and maturities, therefore, the carrying value of these debts approximate its fair value. The other debts, excluding capital leases, outstanding as of December 31, 2017 and 2016 were in the aggregate of \$21.8 million and \$19.3 million, respectively.

The fair value of the Company's TVN defined pension benefit plan liability as of December 31, 2017 and 2016 of \$5.0 million and \$4.3 million, respectively, is disclosed in Note 12, "Employee Benefit Plans and Stock-based Compensation-TVN Retirement Benefit Plan."

During the years ended December 31, 2017, 2016 and 2015 there were no nonrecurring fair value measurements of assets and liabilities subsequent to initial recognition.

The following tables provide the fair value measurement amounts for other financial assets recorded in the Company's Consolidated Balance Sheets based on the three-tier fair value hierarchy:

	Level 1	Level 2	Level 3 ⁽¹⁾	Total
As of December 31, 2017				
Cash equivalents				
Money market funds	\$ 22	\$ —	\$ —	\$ 22
Prepays and other current assets				
Derivative assets	—	33	—	33
Total assets measured and recorded at fair value	\$ 22	\$ 33	\$ —	\$ 55
Accrued and other current liabilities				
Derivative liabilities	\$ —	\$ 4	\$ —	\$ 4
Total liabilities measured and recorded at fair value	\$ —	\$ 4	\$ —	\$ 4

(1) The Company's liability for the TVN VDP at December 31, 2017 was \$5.1 million. This amount is not included in the table above because its fair value at inception, based on Level 3 inputs, was determined during the fourth quarter of fiscal 2016. Subsequently there is no recurring fair value remeasurement for this liability based on the applicable accounting guidance.

	Level 1	Level 2	Level 3 ⁽¹⁾	Total
As of December 31, 2016				
Cash equivalents				
Money market funds	\$ 8,301	\$ —	\$ —	\$ 8,301
Short-term investments				
Corporate bonds	—	6,923	—	6,923
Prepays and other current assets				
Derivative assets	—	54	—	54
Other assets				
Long-term investment	809	—	—	809
Total assets measured and recorded at fair value	\$ 9,110	\$ 6,977	\$ —	\$ 16,087
Accrued and other current liabilities				
Derivative liabilities	\$ —	\$ 40	\$ —	\$ 40
Accrued TVN VDP, current portion	—	—	6,597	6,597
Other non-current liabilities				
Accrued TVN VDP, long-term portion	—	—	3,053	3,053
Total liabilities measured and recorded at fair value	\$ —	\$ 40	\$ 9,650	\$ 9,690

(1) The Company's liability for the TVN VDP is classified within Level 3 because discount rates which are unobservable in the market were being used to measure the fair value of this liability during the fourth quarter of fiscal 2016.

NOTE 6: BUSINESS ACQUISITION

On February 29, 2016, the Company completed its acquisition of TVN, a global leader in advanced video compression solutions headquartered in Rennes, France, for \$82.5 million in cash. The acquisition strengthened the Company's competitive position in the video infrastructure market and enhanced the depth and scale of the Company's research and development and service and support capabilities in the video arena.

During the fourth quarter of 2016, the Company completed the accounting for this business combination. The purchase price has been allocated to tangible and intangible assets acquired and liabilities assumed on the basis of their respective estimated fair values on the acquisition date. The Company's allocation of TVN purchase consideration is as follows (in thousands):

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Assets:

Cash and cash equivalents	\$	6,843
Accounts receivable, net		14,933
Inventories		3,462
Prepaid expenses and other current assets		2,412
Property and equipment, net		9,942
French R&D tax credit receivables ⁽¹⁾		26,421
Other long-term assets		2,134
Total assets	\$	66,147

Liabilities:

Other debts and capital lease obligations, current		8,362
Accounts payable		12,494
Deferred revenue		2,504
Accrued and other current liabilities		18,365
Other debts and capital lease obligations, long-term		16,087
Other non-current liabilities		6,467
Deferred tax liabilities		2,126
Total liabilities	\$	66,405

Goodwill		41,670
Intangibles		41,100
Total purchase consideration	\$	82,512

(1) See Note 9, "Certain Balance Sheet Components-Prepaid expenses and other current assets," for more information on French R&D tax credit receivables.

The following table presents details of the intangible assets acquired through this business combination (in thousands, except years):

	Estimated Useful Life	Fair Value
Backlog	6 months	\$ 3,600
Developed technology	4 years	21,700
Customer relationships	5 years	15,200
Trade name	4 years	600
		\$ 41,100

Acquired identifiable intangible assets were valued using the income method and are amortized on a straight line basis over their respective estimated useful lives. Goodwill of \$41.7 million arising from the acquisition was derived from expected benefits from the business synergies to be derived from the combined entities and the experienced workforce who joined the Company in connection with the acquisition. The goodwill is not expected to be deductible for income tax purposes but the intangibles assets acquired are expected to be deductible for income tax purposes in certain jurisdictions. Both goodwill and intangibles assets acquired were assigned to the Company's video reporting unit.

Acquisition-and integration-related expenses

As a result of the TVN acquisition, the Company incurred acquisition-and integration-related expenses and these costs are expensed as incurred. Acquisition-related costs include outside legal, accounting and other professional services.

Acquisition-and integration-related expenses for the TVN acquisition are summarized in the table below (in thousands):

	Acquisition-related	Integration-related ⁽¹⁾	
	Year ended December 31, 2016	Year ended December 31, 2017 (unaudited)	Year ended December 31, 2016 (unaudited)
Product cost of revenue	\$ —	\$ 342	\$ 1,049
Research and development	—	7	974
Selling, general and administrative	3,855	2,469	11,058
Total acquisition- and integration-related expenses	\$ 3,855	\$ 2,818	\$ 13,081

(1) Integration-related costs include incremental costs resulting from the TVN acquisition that are not expected to generate future benefits once the integration is fully consummated. All integration efforts were completed by 2017 and the Company does not expect any more such expenses to continue after 2017.

NOTE 7: GOODWILL AND IDENTIFIED INTANGIBLE ASSETS

Goodwill

Goodwill represents the difference between the purchase price and the estimated fair value of the identifiable assets acquired and liabilities assumed. Goodwill is allocated among and evaluated for impairment at the reporting unit level, which is defined as an operating segment or one level below an operating segment. The Company has two reporting units, Video and Cable Edge.

The Company tests for goodwill impairment at the reporting unit level on an annual basis, or more frequently if events or changes in circumstances indicate that the asset is more likely than not impaired. The Company's annual goodwill impairment test is performed in the fiscal fourth quarter, with a testing date at the end of fiscal October.

The changes in the Company's carrying amount of goodwill are as follows (in thousands):

	Video	Cable Edge	Total
Balance as of December 31, 2015	\$ 136,904	\$ 60,877	\$ 197,781
Goodwill from TVN acquisition ⁽¹⁾	41,670	—	41,670
Foreign currency translation adjustment	(2,055)	(117)	(2,172)
Balance as of December 31, 2016	\$ 176,519	\$ 60,760	\$ 237,279
Foreign currency translation adjustment	5,493	55	5,548
Balance as of December 31, 2017	\$ 182,012	\$ 60,815	\$ 242,827

(1) Goodwill from the TVN acquisition is assigned to the Company's Video reporting unit.

Application of the goodwill impairment test requires judgment, including the identification of reporting units, assigning assets and liabilities to reporting units, assigning goodwill to reporting units, and determining the fair value of each reporting unit. Significant judgments required to estimate the fair value of reporting units include estimating future cash flows and determining appropriate discount rates, growth rates, an appropriate control premium and other assumptions. Changes in these estimates and assumptions could materially affect the determination of fair value for each reporting unit which could trigger impairment. If the Company's assumptions and related estimates change in the future, or if the Company's reporting structure changes or other events and circumstances change (e.g. such as a sustained decrease in the Company's stock price), the Company may be required to record impairment charges in future periods. Any impairment charges that the Company may take in the future could be material to its results of operations and financial condition.

The Company performed its annual goodwill impairment review at October 31, 2017. As of October 31, 2017, with a closing stock price of \$3.70 on The NASDAQ Stock Market, the Company's market capitalization was approximately \$302 million. When assessing goodwill for impairment, the Company used multiple valuation methodologies to determine its enterprise value and reporting units fair values. The valuation methods used included the Company's market capitalization adjusted for a control premium and the Company's discounted cash flow analysis, which involves making significant assumptions and estimates, including expectations of the Company's future financial performance, the Company's weighted average cost of capital and the Company's interpretation of then currently enacted tax laws. Based on the impairment test performed, management concluded that goodwill was not impaired.

The Company has not recorded any impairment charges related to goodwill for any prior periods.

Intangible Assets

The table below is a summary of the Company’s identified intangible assets (in thousands):

	Weighted Average Remaining Life (Years)	December 31, 2017			December 31, 2016		
		Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Developed core technology	2.2	\$ 31,707	\$ (20,396)	\$ 11,311	\$ 31,707	\$ (15,216)	\$ 16,491
Customer relationships/contracts	3.2	44,819	(35,205)	9,614	44,384	(32,098)	12,286
Trademarks and tradenames	2.2	654	(300)	354	573	(119)	454
Maintenance agreements and related relationships	N/A	5,500	(5,500)	—	5,500	(5,500)	—
Order Backlog	N/A	3,177	(3,177)	—	3,011	(3,011)	—
Total identifiable intangibles		\$ 85,857	\$ (64,578)	\$ 21,279	\$ 85,175	\$ (55,944)	\$ 29,231

Amortization expense for the identifiable intangible assets was allocated as follows (in thousands):

	Year Ended December 31,		
	2017	2016	2015
Included in cost of revenue	\$ 5,180	\$ 4,434	\$ 719
Included in operating expenses	3,142	10,402	5,783
Total amortization expense	\$ 8,322	\$ 14,836	\$ 6,502

The estimated future amortization expense of identifiable intangible assets with definite lives as of December 31, 2017 is as follows (in thousands):

Year ended December 31,	Cost of Revenue	Operating Expenses	Total
2018	\$ 5,180	\$ 3,199	\$ 8,379
2019	5,180	3,199	8,379
2020	951	3,063	4,014
2021	—	507	507
Total future amortization expense	\$ 11,311	\$ 9,968	\$ 21,279

NOTE 8: ACCOUNTS RECEIVABLE

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

	December 31,	
	2017	2016
Accounts receivable, net:		
Accounts receivable	\$ 74,475	\$ 91,596
Less: allowance for doubtful accounts and sales returns	(4,631)	(4,831)
Total	\$ 69,844	\$ 86,765

Trade accounts receivable are recorded at invoiced amounts and do not bear interest. The Company generally does not require collateral and performs ongoing credit evaluations of its customers and provides for expected losses. The Company maintains an allowance for doubtful accounts based upon the expected collectability of its accounts receivable. The expectation

of collectability is based on the Company's review of credit profiles of customers, contractual terms and conditions, current economic trends and historical payment experience.

The following table is a summary of activities in allowances for doubtful accounts and sales returns (in thousands):

	Balance at Beginning of Period	Charges to Revenue	Charges (Credits) to Expense	Additions to (Deductions from) Reserves	Balance at End of Period
Year ended December 31,					
2017	\$ 4,831	\$ 4,030	\$ 881	\$ (5,111)	\$ 4,631
2016	\$ 4,340	\$ 1,488	\$ 1,100	\$ (2,097)	\$ 4,831
2015	\$ 7,057	\$ 1,826	\$ 208	\$ (4,751)	\$ 4,340

NOTE 9: CERTAIN BALANCE SHEET COMPONENTS

The following tables provide details of selected balance sheet components (in thousands):

	December 31,	
	2017	2016
Prepaid expenses and other current assets:		
French R&D tax credits receivables ⁽¹⁾	6,609	5,895
Deferred cost of revenue	4,440	6,856
Prepaid maintenance, royalty, rent, property taxes and value added tax	3,867	5,526
Restricted cash ⁽²⁾	530	731
Other	3,485	7,311
Total	\$ 18,931	\$ 26,319

(1) The Company's acquired TVN subsidiary in France (the "TVN French Subsidiary") participates in the French Crédit d'Impôt Recherche ("CIR") program (the "R&D tax credits") which allows companies to monetize eligible research expenses. The R&D tax credits can be used to offset against income tax payable to the French government in each of the four years after being incurred, or if not utilized, are recoverable in cash. The amount of R&D tax credits recoverable are subject to audit by the French government and in the year ended December 31, 2017 and 2016, the French government approved the 2013 and 2012 claims and refunded \$6.4 million and \$5.8 million to the TVN French Subsidiary, respectively. The remaining R&D tax credit receivables at December 31, 2017 were approximately \$28.5 million and are expected to be recoverable from 2018 through 2021 with \$6.6 million reported under "Prepaid and other Current Assets" and \$21.9 million reported under "Other Long-term Assets" on the Company's Consolidated Balance Sheets.

(2) The restricted cash balances are held as cash collateral security for certain bank guarantees. These restricted funds are invested in bank deposits and cannot be withdrawn from the Company's accounts without the prior written consent of the applicable secured party. Additionally, as of December 31, 2017, the Company had approximately \$1.2 million of restricted cash for the bank guarantee associated with the TVN French Subsidiary's office building lease. This amount is reported under "Other Long-term Assets" on the Company's Consolidated Balance Sheets.

	December 31,	
	2017	2016
Inventories:		
Raw materials	\$ 2,881	\$ 9,889
Work-in-process	933	2,318
Finished goods	10,130	17,776
Service-related spares	12,032	11,210
Total	\$ 25,976	\$ 41,193

	December 31,	
	2017	2016
Property and equipment, net:		
Machinery and equipment ⁽¹⁾	\$ 87,121	\$ 97,989
Capitalized software	35,139	34,519
Leasehold improvements	15,051	14,455
Furniture and fixtures ⁽¹⁾	6,534	8,993
Property and equipment, gross	143,845	155,956
Less: accumulated depreciation and amortization ⁽¹⁾	(114,580)	(123,792)
Total	<u>\$ 29,265</u>	<u>\$ 32,164</u>

(1) The reductions in these balances in 2017, compared to 2016, were due to retirement of fully depreciated assets.

	December 31,	
	2017	2016
Accrued and other current liabilities:		
Accrued employee compensation and related expenses	\$ 16,414	\$ 19,377
Customer deposits	5,020	4,537
Accrued warranty	4,381	4,862
Contingent inventory reserves	3,806	2,210
Accrued TVN VDP, current ⁽¹⁾	3,186	6,597
Accrued royalty payments	2,195	1,912
Other	13,703	15,655
Total	<u>\$ 48,705</u>	<u>\$ 55,150</u>

(1) See Note 10, "Restructuring and related charges" for additional information on the Company's TVN VDP liabilities.

NOTE 10: RESTRUCTURING AND RELATED CHARGES

The Company implemented several restructuring plans in the past few years. The goal of these plans was to bring operational expenses to appropriate levels relative to Company's net revenues, while simultaneously implementing extensive company-wide expense control programs.

The Company accounts for its restructuring plans under the authoritative guidance for exit or disposal activities. The restructuring and asset impairment charges are included in "Product cost of revenue" and "Operating expenses-restructuring and related charges" in the Consolidated Statements of Operations. The following table summarizes the Company's restructuring and related charges (in thousands):

	Year ended December 31,		
	2017	2016 ⁽¹⁾	2015
Product cost of revenue	\$ 1,279	\$ 3,400	\$ 113
Operating expenses-Restructuring and related charges	5,307	14,602	1,372
Total	\$ 6,586	\$ 18,002	\$ 1,485

(1) The restructuring and related charges for the year ended December 31, 2016 is net of \$0.6 million and \$1.4 million, in product cost of revenue and operating expenses-restructuring and related charges, respectively, of gain from TVN pension curtailment. See discussion below "Harmonic 2016 Restructuring Plan-TVN VDP" for additional information on the gain from TVN pension curtailment.

Harmonic 2017 Restructuring

In the third quarter of 2017, the Company implemented a restructuring plan (the "Harmonic 2017 Restructuring Plan") to better align its operating costs with the continued decline in its net revenues. In 2017, the Company recorded \$2.5 million of restructuring and related charges under this plan consisting of \$2.1 million of employee severance and \$0.4 million related to the closure of one of the Company's offices in New York. The activities under this plan were completed in 2017. In 2017, the Company made \$2.0 million payments for this plan and the remaining \$0.5 million liability outstanding at December 31, 2017 which relates to the accrual for the New York excess facility will be paid out over the remainder of the New York leased properties' terms, which continue through August 2020.

Harmonic 2016 Restructuring

In the first quarter of 2016, the Company implemented a restructuring plan (the "Harmonic 2016 Restructuring Plan") to reduce operating costs by consolidating duplicative resources in connection with the acquisition of TVN. The planned activities included global workforce reductions, exiting certain operating facilities and disposing of excess assets and an employee voluntary departure plan in France (the "TVN VDP").

In 2016, the Company recorded an aggregate of \$20.0 million of restructuring and related charges under the Harmonic 2016 Restructuring Plan, of which \$2.2 million is primarily related to the exit from the excess facility at the U.S. headquarters and the remaining \$17.8 million is related to severance and benefits for the termination of 118 employees worldwide, including 83 employees in France who participated in the TVN VDP. Additionally, the restructuring and related charges under this plan were offset by \$2.0 million of gain from TVN pension curtailment. For the employees who participated in the TVN VDP, their pension benefit will be funded by the TVN VDP and as a result, the TVN defined benefit pension plan was remeasured at December 31, 2016, which resulted in a non-cash curtailment gain. In 2017, the Company recorded an additional \$1.1 million in severance and benefits and this plan was completed in June 2017.

TVN VDP

Based on the applicable accounting guidance, the Company recorded \$1.8 million and \$13.1 million of TVN VDP costs in the years ended December 31, 2017 and 2016, respectively. In aggregate, in 2016 and 2017, the Company had paid \$10.7 million of TVN VDP costs. The TVN VDP liability balance as of December 31, 2017 was \$5.1 million, payable from 2018 through 2020.

Excess Facilities in San Jose, California

In January 2016, the Company exited an excess facility at its U.S. headquarters in San Jose, California and recorded \$1.4 million in facility exit costs. The fair value of these liabilities is based on a net present value model using a credit-adjusted risk-

free rate. The liability will be paid out over the remainder of the leased properties' terms, which continue through August 2020. As of the cease-use date, the fair value of this restructuring liability totaled \$2.5 million. Offsetting these charges was an adjustment for deferred rent liability relating to this space of \$1.1 million. As a result of a change in the estimate of the sublease income, the restructuring liability was increased by \$1.2 million and \$0.6 million, as of December 31, 2017 and 2016, respectively.

The following table summarizes the activity in the Company's restructuring accrual related to the Harmonic 2016 Restructuring Plan (in thousands):

	Excess facilities	VDP	Non-VDP Severance and benefits	Other charges	Total
Charges for 2016 Restructuring Plan	\$ 1,655	\$ 13,175	\$ 4,702	\$ 247	\$ 19,779
Adjustments to restructuring provisions	582	—	(88)	(247)	247
Reclassification of deferred rent	1,087	—	—	—	1,087
Cash payments	(948)	(3,484)	(3,075)	—	(7,507)
Foreign exchange loss	(1)	(41)	(20)	—	(62)
Balance at December 31, 2016	2,375	9,650	1,519	—	13,544
Adjustments to restructuring provisions	1,223	1,766	1,134	—	4,123
Cash payments	(1,172)	(7,203)	(2,690)	—	(11,065)
Foreign exchange gain	—	915	37	—	952
Balance at December 31, 2017	2,426	5,128	—	—	7,554
Less: current portion ⁽¹⁾	(645)	(3,186)	—	—	(3,831)
Long-term portion ⁽¹⁾	\$ 1,781	\$ 1,942	\$ —	\$ —	\$ 3,723

(1) The current portion and long-term portion of the restructuring liability are reported under "Accrued and other current liabilities" and "Other non-current liabilities", respectively, on the Company's Consolidated Balance Sheets.

Harmonic 2015 Restructuring

In the fourth quarter of 2014, the Company implemented the Harmonic 2015 Restructuring Plan to reduce operating costs. The plan was completed in 2015 and the Company recorded \$3.7 million restructuring charges, in aggregate, under this plan, of which \$2.2 million and \$1.5 million were recorded in 2014 and 2015, respectively. All liabilities under this plan were fully paid in 2016.

NOTE 11: CONVERTIBLE NOTES, OTHER DEBTS AND CAPITAL LEASES

4.00% Convertible Senior Notes

In December 2015, the Company issued \$128.25 million aggregate principal amount of 4.00% unsecured convertible senior notes due December 1, 2020 (the "offering" or "Notes", as applicable) through a private placement with a financial institution. The Notes do not contain any financial covenants and the Company can settle the Notes in cash, shares of common stock, or any combination thereof. The Notes can be converted under certain circumstances described below, based on an initial conversion rate of 173.9978 shares of common stock per \$1,000 principal amount of Notes (which represents an initial conversion price of approximately \$5.75 per share). Interest on the Notes is payable semiannually in arrears on June 1 and December 1 of each year.

Concurrent with the closing of the offering, the Company used \$49.9 million of the net proceeds to repurchase 11.1 million shares of the Company's common stock from purchasers of the offering in privately negotiated transactions. In addition, the Company incurred approximately \$4.1 million of debt issuance cost resulting in net proceeds to the Company of approximately \$74.2 million, which was used to fund the TVN acquisition.

Prior to September 1, 2020, the Notes will be convertible only under the following circumstances: (1) during any fiscal quarter (and only during such fiscal quarter), if the last reported sale price of the Company's common stock for at least 20 trading days (whether or not consecutive) during a period of 30 consecutive trading days ending on the last trading day of the immediately preceding fiscal quarter is greater than or equal to 130% of the conversion price of the Notes on each applicable trading day; (2) during the five business day period after any 5 consecutive trading day period (the "measurement period") in which the trading price per \$1,000 principal amount of Notes for each trading day of the measurement period was less than

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98% of the product of the last reported sale price of the Company's common stock and the conversion rate on each such trading day; or (3) upon the occurrence of specified corporate events. Commencing on September 1, 2020 until the close of business on the second scheduled trading day immediately preceding the maturity date, the Notes will be convertible in multiples of \$1,000 principal amount regardless of the foregoing circumstances.

If a fundamental change occurs, holders of the Notes may require the Company to purchase all or any portion of their Notes for cash at a repurchase price equal to 100% of the principal amount of the Notes to be repurchased, plus any accrued and unpaid interest to, but excluding, the fundamental change repurchase date. In addition, if specific corporate events occur prior to the maturity date, the conversion rate may be increased for a holder who elects to convert the Notes in connection with such a corporate event.

In accordance with accounting guidance on embedded conversion features, the conversion feature associated with the Notes is valued and bifurcated from the host debt instrument and recorded in stockholders' equity. The resulting debt discounts on the Notes are being amortized to interest expense at the effective interest rate over the contractual terms of the Notes. The following table presents the components of the Notes as of December 31, 2017 and December 31, 2016 (in thousands, except for years and percentages):

	December 31,	
	2017	2016
Liability:		
Principal amount	\$ 128,250	128,250
Less: Debt discount, net of amortization	(17,404)	(22,302)
Less: Debt issuance costs, net of amortization	(2,098)	(2,689)
Carrying amount	\$ 108,748	103,259
Remaining amortization period (years)	2.9 years	3.9 years
Effective interest rate on liability component	9.94%	9.94%
Carrying amount of equity component	\$ 26,062	\$ 26,062

The following table presents interest expense recognized related to the Notes (in thousands):

	Year ended December 31,		
	2017	2016	2015
Contractual interest expense	\$ 5,130	5,130	240
Amortization of debt discount	4,898	4,430	193
Amortization of debt issuance costs	591	534	23
Total interest expense recognized	\$ 10,619	10,094	456

Other Debts and Capital Leases

In connection with the TVN acquisition, the Company assumed a variety of debt and credit facilities in France to satisfy the financing requirements of TVN operations. These arrangements are summarized in the table below (in thousands):

	December 31,	
	2017	2016
Financing from French government agencies related to various government incentive programs ⁽¹⁾	20,565	17,930
Term loans	1,282	1,400
Obligations under capital leases	1,099	1,860
Total debt obligations	22,946	21,190
Less: current portion	(7,610)	(7,275)
Long-term portion	15,336	13,915

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(1) Loans backed by French R&D tax credit receivables were \$17.7 million and \$14.7 million as of December 31, 2017 and 2016, respectively. As of December 31, 2017, the TVN French Subsidiary had an aggregate of \$28.5 million of R&D tax credit receivables from the French government from 2018 through 2021. (See Note 9, "Certain Balance Sheet Components-Prepaid expenses and other current assets," for more information). These tax loans have a fixed rate of 0.6%, plus EURIBOR 1 month plus 1.3% and mature between 2018 through 2020. The remaining loans of \$2.9 million and \$3.2 million as of December 31, 2017 and 2016, respectively, primarily relate to financial support from French government agencies for R&D innovation projects at minimal interest rates and the loans outstanding at December 31, 2017 mature between 2020 through 2025.

Future minimum repayments

The table below shows the future minimum repayments of debts and capital lease obligations as of December 31, 2017 (in thousands):

Years ending December 31,	Capital lease obligations	Other Debt obligations
2018	930	6,674
2019	95	7,141
2020	51	6,942
2021	23	515
2022	—	474
Thereafter	—	101
Total	<u>\$ 1,099</u>	<u>\$ 21,847</u>

Line of Credit

On September 27, 2017, the Company entered into a Loan and Security Agreement (the "Loan Agreement") with Silicon Valley Bank (the "Bank"). The Loan Agreement provides for a secured revolving credit facility in an aggregate principal amount of up to \$15.0 million. Under the terms of the Loan Agreement, the principal amount of loans, plus the face amount of any outstanding letters of credit, at any time cannot exceed up to 85% of the Company's eligible receivables. Under the terms of the Loan Agreement, the Company may also request letters of credit from the Bank. The proceeds of any loans under the Loan Agreement will be used for working capital and general corporate purposes.

Loans under the Loan Agreement will bear interest, at the Company's option, and subject to certain conditions, at an annual rate of either a prime rate or a LIBOR rate plus an applicable margin of 2.25%. There will be no applicable margin for prime rate advances when the Company is in compliance with the liquidity requirement of at least \$20.0 million in the aggregate of consolidated cash plus availability under the Loan Agreement (the "Liquidity Requirement") and a 0.25% margin for prime rate advances when the Company is not in compliance with the Liquidity Requirement. The Company may not request LIBOR advances when it is not in compliance with the Liquidity Requirement. Interest on each advance is due and payable monthly and the principal balance is due at maturity. The Company's obligations under the revolving credit facility are secured by a security interest on substantially all of its assets, excluding intellectual property. The Loan Agreement contains customary affirmative and negative covenants. The Company must comply with financial covenants requiring it to maintain (i) minimum a short-term asset to short-term liabilities ratio and (ii) minimum adjusted EBITDA, in the amounts and for the periods as set forth in the Loan Agreement. The Company must also maintain a minimum liquidity amount, comprised of unrestricted cash held at accounts with the Bank plus proceeds available to be drawn under the Loan Agreement, equal to \$10.0 million at all times. As of December 31, 2017, the Company was in compliance with the covenants under the Loan Agreement.

There were no borrowings under the Loan Agreement from the closing of the Loan Agreement through December 31, 2017.

NOTE 12: EMPLOYEE BENEFIT PLANS AND STOCK-BASED COMPENSATION

Equity Award Plans

1995 Stock Plan

The 1995 Stock Plan provides for the grant of incentive stock options, non-statutory stock options and RSUs. Incentive stock options may be granted only to employees. All other awards may be granted to employees and consultants. Under the terms of the 1995 Stock Plan, incentive stock options may be granted at prices not less than 100% of the fair value of the

Company’s common stock on the date of grant and non-statutory stock options may be granted at prices not less than 85% of the fair value of the Company’s common stock on the date of grant. RSUs have no exercise price. Both options and RSUs vest over a period of time as determined by the Company’s Board of Directors (the “Board”), generally two to four years, and expire seven years from date of grant. Grants of RSUs and any non-statutory stock options issued at prices less than the fair market value on the date of grant decrease the plan reserve 1.5 shares for every unit or share granted and any forfeitures of these awards due to their not vesting would increase the plan reserve by 1.5 shares for every unit or share forfeited. The Company’s stockholders approved an amendment to the 1995 Stock Plan at the Company’s 2017 annual meeting of stockholders (“2017 Annual Meeting”) which increased the number of shares of common stock reserved for issuance under the 1995 Stock Plan by 7,000,000 shares. As of December 31, 2017, an aggregate of 14,858,418 shares of common stock were reserved for issuance under the 1995 Stock Plan, of which 8,381,707 shares remained available for grant.

2002 Director Plan

The 2002 Director Plan provides for the grant of non-statutory stock options and RSUs to non-employee directors of the Company. Under the terms of the 2002 Director Plan, non-statutory stock options may be granted at prices not less than 100% of the fair value of the Company’s common stock on the date of grant. RSUs have no exercise price. Both options and RSUs vest over a period of time as determined by the Board, generally three years for the initial grant and one year for subsequent grants to a non-employee director, and expire seven years from date of grant. Grants of RSUs decrease the plan reserve 1.5 shares for every unit granted and any forfeiture of these awards due to their not vesting would increase the plan reserve by 1.5 shares for every unit forfeited. The Company’s stockholders approved an amendment to the 2002 Director Stock Plan at the 2017 Annual Meeting which increased the number of shares of common stock reserved for issuance under the 2002 Director Stock Plan by 400,000 shares. As of December 31, 2017, an aggregate of 837,174 shares of common stock were reserved for issuance under the 2002 Director Plan, of which 623,034 shares remained available for grant.

Employee Stock Purchase Plan

The 2002 Employee Stock Purchase Plan (“ESPP”) provides for the issuance of share purchase rights to employees of the Company. The ESPP is intended to qualify as an “employee stock purchase plan” under Section 423 of the Internal Revenue Code. The ESPP enables employees to purchase shares at 85% of the fair market value of the Common Stock at the beginning or end of the offering period, whichever is lower. Offering periods generally begin on the first trading day on or after January 1 and July 1 of each year. Employees may participate through payroll deductions of 1% to 10% of their earnings. In the event that there are insufficient shares in the plan to fully fund the issuance, the available shares will be allocated across all participants based on their contributions relative to the total contributions received for the offering period. Under the ESPP, 1,291,875, 1,265,458 and 888,152 shares were issued during fiscal 2017, 2016 and 2015, respectively, representing \$4.4 million, \$3.7 million and \$5.2 million in contributions. As of December 31, 2017, 1,114,796 shares were reserved for future purchases by eligible employees.

Stock Option and RSU activities

The following table summarizes the Company’s stock option and RSU activities during the year ended December 31, 2017 (in thousands, except per share amounts):

	Shares Available for Grant	Stock Options Outstanding		Restricted Stock Units Outstanding	
		Number of Shares	Weighted Average Exercise Price	Number of Units	Weighted Average Grant Date Fair Value
Balance at December 31, 2016	3,912	5,019	\$ 6.01	3,864	\$ 4.26
Authorized	7,400	—	—	—	—
Granted	(5,351)	30	5.10	3,546	5.12
Options exercised	—	(106)	2.97	—	—
Shares released	—	—	—	(3,184)	4.10
Forfeited or canceled	3,043	(1,063)	6.18	(1,322)	5.14
Balance at December 31, 2017	9,004	3,880	\$ 6.04	2,904	\$ 5.09

The following table summarizes information about stock options outstanding as of December 31, 2017 (in thousands, except per share amounts and term):

	Number of Shares	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value
Vested and expected to vest	3,845	\$ 6.06	2.8	\$ 946
Exercisable	3,367	6.21	2.6	664

The intrinsic value of options vested and expected to vest and exercisable as of December 31, 2017 is calculated based on the difference between the exercise price and the fair value of the Company's common stock as of December 31, 2017. The intrinsic value of options exercised during the years ended December 31, 2017, 2016 and 2015 was \$0.3 million, \$0.1 million and \$1.7 million, respectively, and is calculated based on the difference between the exercise price and the fair value of the Company's common stock as of the exercise date.

The following table summarizes information about RSUs outstanding as of December 31, 2017 (in thousands, except term):

	Number of Shares Underlying Restricted Stock Units	Weighted Average Remaining Vesting Period (Years)	Aggregate Fair Value
Vested and expected to vest	2,402	0.6	\$ 10,088

The fair value of RSUs vested and expected to vest as of December 31, 2017 is calculated based on the fair value of the Company's common stock as of December 31, 2017.

Performance- and Market-based awards

Starting 2015, the Company began to fund a portion of its incentive bonus payment to its eligible employees issuing performance-based RSU ("PRSU") awards from the 1995 Stock Plan. The Company granted 1,165,685, 898,533 and 395,760 shares of PRSUs to its employees during the years ended December 31, 2017, 2016 and 2015, respectively, of which 1,165,685, 610,579 and 239,744 shares of PRSUs vested during the years December 31, 2017, 2016 and 2015, respectively. No PRSUs awards were outstanding as of December 31, 2017. The vesting of the PRSUs awards is based on the achievement of certain financial and non-financial operating goals of the Company. The stock-based compensation recognized for PRSUs were \$3.2 million, \$2.8 million and \$0.6 million, for the years ended December 31, 2017, 2016 and 2015, respectively.

In 2017, the Company granted 344,500 market-based RSUs ("MRSUs") under the 1995 Stock Plan to its key executives and certain eligible employees that may vest during a three-year period as part of its long-term incentive program. The vesting conditions of these awards are tied to the market value of the Company's common stock. None of the MRSUs vested during the year ended December 31, 2017. The fair value of these shares was estimated using a Monte-Carlo simulation and the stock-based compensation recognized in 2017 for these MRSUs was \$0.9 million. The unrecognized stock-based compensation at December 31, 2017 was \$0.2 million for the MRSU and is expected to be fully recognized in 2018.

TVN Employee Equity Benefit Plan

In connection with the TVN acquisition, the Company assumed two of TVN's existing employee equity benefit plans, which were fully vested and settled in 2016 for \$2.9 million.

French Retirement Benefit Plan

Under French law, the Company's subsidiaries in France, including the acquired TVN French Subsidiary, are obligated to make certain payments to its employees upon their retirement from the Company. These payments are based on the retiring employee's salary for a number of months that varies according to the employee's period of service and position. Salary used in the calculation is the employee's average monthly salary for the twelve months prior to retirement. The payments are made in one lump-sum at the time of retirement. The French pension plan is unfunded and there are no contributions to the plan required by any laws or funding regulations, discretionary contributions or non-cash contributions expected to be made.

The company's defined benefit pension obligations are measured as of December 31. The present value of these lump-sum payments is determined on an actuarial basis and the actuarial valuation takes into account the employees' age and period of service with the company, projected mortality rates, mobility rates and increases in salaries, and a discount rate.

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The table below shows the present value of the Company's pension obligations as of December 31, 2017 and December 31, 2016 and the changes to the Company's pension obligations for each of those years (in thousands):

	December 31,	
	2017	2016
Projected benefit obligation:		
Balance at January 1	\$ 4,264	\$ —
Acquired from TVN acquisition	—	5,907
Service cost	259	217
Interest cost	71	87
Actuarial (gains) losses	(528)	279
Curtailement ⁽¹⁾	—	(1,955)
Adjustment for prior year balance	343	—
Foreign currency translation adjustment	624	(271)
Balance at December 31	<u>\$ 5,033</u>	<u>\$ 4,264</u>

Presented on the Consolidated Balance Sheets under:

Current portion (presented under "Accrued and other current liabilities")	\$ 34	27
Long-term portion (presented under "Other non-current liabilities")	\$ 4,999	4,237

(1) As a result of the TVN VDP, the defined benefit pension plan was remeasured in the fourth quarter of 2016, which resulted in a non-cash curtailment gain of \$2.0 million. The curtailment gain was recognized in the Consolidated Statement of Operations during the fourth quarter of 2016 and the Company's pension liability was reduced by the same amount. Of the \$2.0 million pension curtailment gain, \$0.6 million is included in product cost of revenue and the remaining \$1.4 million is included in operating expenses-restructuring and related charges in the Consolidated Statement of Operations. The remeasurement did not have a material effect on other components of net periodic pension expense for the year ended December 31, 2016.

The table below shows the components of net periodic benefit costs (in thousands):

	Year ended December 31,	
	2017	2016
Service cost	\$ 259	\$ 217
Interest cost	71	87
Amortization of net actuarial loss (gain) ⁽¹⁾	—	—
Net periodic benefit cost included in operating loss	<u>\$ 330</u>	<u>\$ 304</u>

(1) The Company uses the allowable 10% corridor approach to determine the amount of actuarial gains or losses subject to amortization in pension cost. Gains or losses are amortized on a straight-line basis over the average future remaining service period of active plan participants.

The following assumptions were used in determining the Company's pension obligation:

	December 31,	
	2017	2016
Discount rate	1.5%	1.5%
Mobility rate	6.0%	3.0%
Salary progression rate	2.0%	2.0%

The Company evaluates the discount rate assumption annually. The discount rate is determined using the average yields on high-quality fixed-income securities that have maturities consistent with the timing of benefit payments.

The Company also evaluates other assumptions related to demographic factors, such as retirement age, mortality rates and turnover periodically, updating them to reflect experience and expectations for the future. The mortality assumption related

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to the Company's defined benefit pension plan used mortality tables published in January 2017, which is the most current, by the French National Institute of Statistics and Economic Studies.

As of December 31, 2017, future benefits expected to be paid in each of the next five years, and in the aggregate for the five year period thereafter are as follows (in thousands):

Years ending December 31,	
2018	\$ 34
2019	53
2020	—
2021	44
2022	143
2023 - 2027	2,858
	<u>\$ 3,132</u>

401(k) Plan

The Company has a retirement/savings plan which qualifies as a thrift plan under Section 401(k) of the Internal Revenue Code. This plan allows participants to contribute up to the applicable Internal Revenue Code limitations under the plan. The Company can make discretionary contributions to the plan of 25% of the first 4% contributed by eligible participants, up to a maximum contribution per participant of \$1,000 per year. The Company's contributions to the plan were \$0.3 million for fiscal year 2017 and \$0.4 million for each of the fiscal years 2016 and 2015.

Stock-based Compensation

The following table summarizes stock-based compensation expense for all plans (in thousands):

	Year ended December 31,		
	2017	2016	2015
Stock-based compensation in:			
Cost of revenue	\$ 2,370	\$ 1,554	\$ 1,862
Research and development expense	5,313	3,711	4,435
Selling, general and administrative expense	8,927	7,795	9,285
Total stock-based compensation in operating expense	<u>14,240</u>	<u>11,506</u>	<u>13,720</u>
Total stock-based compensation recognized in net loss	<u>\$ 16,610</u>	<u>\$ 13,060</u>	<u>\$ 15,582</u>

As of December 31, 2017, total unrecognized stock-based compensation cost, net of estimated forfeitures, related to unvested stock options and RSUs was \$9.9 million and is expected to be recognized over a weighted-average period of 1.4 years.

Valuation Assumptions

The Company estimates the fair value of employee stock options and stock purchase rights under the ESPP using a Black-Scholes option valuation model. The value of the stock purchase rights under the ESPP consists of: (1) the 15% discount on the purchase of the stock; (2) 85% of the fair value of the call option; and (3) 15% of the fair value of the put option. The call option and put option were valued using the Black-Scholes option pricing model. At the date of grant, the Company estimated the fair value of each stock option grant and stock purchase right granted under the ESPP using the following weighted average assumptions:

	Employee Stock Options			ESPP		
	2017	2016	2015	2017	2016	2015
Expected term (in years)	4.30	4.30	4.65	0.50	0.50	0.50
Volatility	42%	36%	38%	48%	70%	34%
Risk-free interest rate	1.8%	1.4%	1.5%	1.2%	0.6%	0.3%
Expected dividends	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The expected term of the employee stock option represents the weighted-average period that the stock options are expected to remain outstanding. The computation of expected term was determined based on historical experience of similar awards, giving consideration to the contractual terms of the stock-based awards, vesting schedules and expectations of future employee behavior. The expected term of the stock purchase right under ESPP represents the period of time from the beginning of the offering period to the purchase date. The Company uses its historical volatility for a period equivalent to the expected term of the options to estimate the expected volatility. The risk-free interest rate that the Company uses in the Black-Scholes option valuation model is based on U.S. Treasury zero-coupon issues with remaining terms similar to the expected term. The Company has never declared or paid any cash dividends and does not plan to pay cash dividends in the foreseeable future, and, therefore, used an expected dividend yield of zero in the valuation model.

Prior to January 1, 2017, stock-based compensation expense was recorded net of estimated forfeitures in the Company's Consolidated Statements of Operations and, accordingly, was recorded for only those stock-based awards that the Company expected to vest. Upon the adoption of the accounting standard update (ASU 2016-09, "Improvements to Employee Share-Based payments") issued by FASB, effective January 1, 2017, the Company changed its accounting policy to account for forfeitures as they occur. The change was applied on a modified retrospective approach with a cumulative effect adjustment of \$69,000 to retained earnings as of January 1, 2017 (which increased the accumulated deficit).

The weighted-average fair value per share of options granted for the years ended December 31, 2017, 2016 and 2015 was \$1.85, \$0.99 and \$2.51, respectively. The fair value of all stock options vested during the years ended December 31, 2017, 2016 and 2015 was \$1.7 million, \$2.3 million and \$3.0 million, respectively.

The estimated weighted-average fair value per share of stock purchase rights granted for the years ended December 31, 2017, 2016 and 2015 was \$1.50, \$1.04 and \$1.69, respectively.

The Company realized no income tax benefit from stock option exercises for the years ended December 31, 2017, 2016 and 2015 due to recurring losses and valuation allowances.

The estimated fair value of RSUs is based on the market price of the Company's common stock on the grant date. The fair value of all restricted stock units issued during the years ended December 31, 2017, 2016 and 2015 was \$13.0 million, \$9.7 million and \$11.1 million, respectively.

NOTE 13: STOCKHOLDERS' EQUITY

Preferred Stock

Harmonic has 5,000,000 authorized shares of preferred stock. No shares of preferred stock were issued or outstanding in any of the periods presented.

Common Stock Repurchases

Our stock repurchase program expired on December 31, 2016. No stock was repurchased during the fiscal year of 2017 and 2016. Any further stock repurchases would require authorization from the Board.

Accumulated Other Comprehensive Income (Loss) ("AOCI")

The components of AOCI, on an after-tax basis where applicable, were as follows (in thousands):

	December 31,	
	2017	2016
Foreign currency translation adjustments	\$ 4,310	\$ (7,267)
Unrealized foreign exchange loss on intercompany long-term loans, net of taxes	(1,177)	—
Gain on investments, net of taxes ⁽¹⁾	—	276
Actuarial gain (loss)	249	(279)
Total accumulated other comprehensive income (loss)	\$ 3,382	\$ (7,270)

(1) See Consolidated Statements of Comprehensive Loss for the amounts related to investments that were reclassified into the Consolidated Statements of Operations for the periods presented.

NOTE 14: INCOME TAXES

Loss from operations before income taxes consists of the following (in thousands):

	Year ended December 31,		
	2017	2016	2015
United States	\$ (50,041)	\$ (53,833)	\$ (16,826)
International	(34,666)	(26,597)	758
Loss before income taxes	\$ (84,707)	\$ (80,430)	\$ (16,068)

The components of the benefit from income taxes consist of the following (in thousands):

	Year ended December 31,		
	2017	2016	2015
Current:			
Federal	\$ (4,530)	\$ (950)	\$ (1,981)
State	129	181	120
International	273	2,738	1,966
Deferred:			
Federal	—	(713)	—
State	—	—	—
International	2,376	(9,372)	(512)
Total benefit from income taxes	\$ (1,752)	\$ (8,116)	\$ (407)

The differences between the benefit from income taxes computed at the U.S. federal statutory rate at 35% and the Company's actual benefit from income taxes are as follows (in thousands):

	Year ended December 31,		
	2017	2016	2015
Benefit from for income taxes at U.S. Federal statutory rate	\$ (29,648)	\$ (28,150)	\$ (5,624)
Differential in rates on foreign earnings	15,920	11,741	1,584
Non-deductible amortization expense	—	617	947
Tax Reform Tax rate reduction	14,527	—	—
Change in valuation allowance	(2,834)	4,465	2,230
Change in liabilities for uncertain tax positions	(2,009)	(960)	(1,083)
Non-deductible stock-based compensation	1,934	1,480	1,398
Non-deductible meals and entertainment	380	441	395
Non-deductible acquisition cost	—	—	457
Adjustments related to tax positions taken during prior years	(473)	(163)	(781)
Adjustments made under intercompany transactions	—	1,779	—
Tax Refund	(834)	—	—
Other	1,285	634	70
Total benefit from income taxes	\$ (1,752)	\$ (8,116)	\$ (407)

The Company operates in multiple jurisdictions and its profits are taxed pursuant to the tax laws of these jurisdictions. Our effective income tax rate may be affected by changes in or interpretations of tax laws and tax agreements in any given jurisdiction, utilization of net operating loss and tax credit carry forwards, changes in geographical mix of income and expense, and changes in management's assessment of matters such as the ability to realize deferred tax assets. The Company's effective tax rate varies from year to year primarily due to the absence of several onetime, discrete items that benefited or decremented the tax rates in the previous years.

In 2017, the Company had a worldwide consolidated loss before tax of \$84.7 million and tax benefit of \$1.8 million, with an effective income tax rate of 2%. The Company's 2017 effective income tax rate differed from the U.S. federal statutory rate of 35% primarily due to the Company's geographical income mix, favorable tax rates associated with certain earnings from operations in lower-tax jurisdictions, tax rate change in foreign jurisdictions, tax benefits associated with the release of tax reserves for uncertain tax positions resulting from the expiration of the statutes of limitations, a one-time benefit of \$2.6 million

from the reduction of a valuation allowance on alternative minimum tax (“AMT”) credit carryforwards that will be refundable as a result of the TCJA, partially offset by the increase in the valuation allowance against U.S. federal, California and other state deferred tax assets, detriment from non-deductible stock-based compensation, and the net of various other discrete tax adjustments.

On December 22, 2017, the Tax Cuts and Jobs Act (the “TCJA”) was enacted which, among other things, lowered the U.S. federal corporate income tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. As of December 31, 2017, the Company has not completed the accounting for the tax effects of enactment of the TCJA; however, the effects on existing deferred tax balances has been determined and recorded. The impact of remeasuring deferred tax assets at the lower tax rate is a \$14.5 million reduction of the value of net deferred tax assets (which represent future tax benefits), which is offset by a corresponding reduction in the related valuation allowance. As a result, there is net zero impact to the Company’s tax expense for 2017. Under the TCJA, the corporate AMT was repealed. Therefore, corporations which have been unable to utilize AMT credit carryforwards now have the opportunity to realize them through cash refunds. The Company has an AMT credit carryforward of \$2.6 million that previously was not considered realizable and as such had a valuation allowance recorded. As a result of the TCJA, the valuation allowance was released and is reflected as a benefit in the Company’s 2017 income tax provision. The Company has reclassified the \$2.6 million credit carryforward to other receivables in the consolidated balance sheet to reflect the expected cash refund.

The TCJA also includes a requirement to pay a one-time transition tax on the cumulative value of earnings and profits that were previously not repatriated for U.S. income tax purposes. Although the Company currently does not expect to be impacted by the mandatory deemed repatriation provision of the TCJA., because the Company believes our cumulative unremitted earnings and profits are negative, due to the complexity of our international tax and legal entity structure, the Company will continue to analyze the earnings and profits and tax pools of our foreign subsidiaries to reasonably estimate the effects of the mandatory deemed repatriation provision of the TCJA over the one-year measurement period.

In 2016, the Company had a worldwide consolidated loss before tax of \$80.4 million and tax benefit of \$8.1 million, with an annual effective tax rate of 10%. The Company’s 2016 effective income tax rate differed from the U.S. federal statutory rate of 35% primarily due to geographical income mix and its tax valuation allowance, favorable tax rates associated with certain earnings from operations in lower-tax jurisdictions, favorable resolutions of uncertain tax positions, and the tax benefit from the realization of certain deferred tax assets as a result of the TVN acquisition, partially offset by the increase in the valuation allowance against U.S. federal, California and other state deferred tax assets, detriment from non-deductible stock-based compensation, non-deductible amortization of foreign intangibles, and the net of various discrete tax adjustments.

In 2015, the Company had a worldwide consolidated loss before tax of \$16.1 million and tax benefit of \$0.4 million, with an effective income tax rate of 3%. The Company’s 2015 effective income tax rate differed from the U.S. federal statutory rate of 35% primarily due to a difference in foreign tax rates and the Company’s U.S. losses generated for the year received no tax benefit as a result of a full valuation allowance against all of its U.S. deferred tax assets, as well as adjustments relating to its 2014 U.S. federal tax return filed in September 2015 and the reversal of uncertain tax positions resulting from the expiration of the statutes of limitations. In addition, the impairment of the VJU investment (see Note 3, “Investments in Other Equity Securities”) received no tax benefit.

The components of net deferred tax assets included in the Consolidated Balance Sheets are as follows (in thousands):

	December 31,	
	2017	2016
Deferred tax assets:		
Reserves and accruals	\$ 17,247	\$ 25,527
Net operating loss carryforwards	34,915	33,321
Research and development credit carryforwards	34,419	28,759
Deferred stock-based compensation	2,677	4,292
Depreciation and amortization	—	554
Intangibles	2,062	—
Other tax credits	—	2,738
Other	1,441	—
Gross deferred tax assets	92,761	95,191
Valuation allowance	(77,756)	(74,480)
Gross deferred tax assets after valuation allowance	15,005	20,711
Deferred tax liabilities:		
Depreciation and amortization	(259)	—
Intangibles	—	(1,417)
Convertible notes	(4,284)	(8,603)
Other	—	(510)
Gross deferred tax liabilities	(4,543)	(10,530)
Net deferred tax assets	\$ 10,462	\$ 10,181

The following table summarizes the activities related to the Company's valuation allowance (in thousands):

	Year ended December 31,		
	2017	2016	2015
Balance at beginning of period	\$ 74,480	\$ 64,545	\$ 75,199
Additions	9,028	18,291	3,068
Deductions	(5,752)	(8,356)	(13,722)
Balance at end of period	\$ 77,756	\$ 74,480	\$ 64,545

Management regularly assesses the ability to realize deferred tax assets recorded based upon the weight of available evidence, including such factors as recent earnings history and expected future taxable income on a jurisdiction by jurisdiction basis. In the event that the Company changes its determination as to the amount of realizable deferred tax assets, the Company will adjust its valuation allowance with a corresponding impact to the provision for income taxes in the period in which such determination is made.

In 2017, the Company continued to record a valuation allowance against all of its United States deferred tax assets as well as its net operating losses generated in 2017 due to significant cumulative losses in the United States, resulting in a net increase in valuation allowance of \$9.0 million. This increase in valuation allowance is offset partially by the release of \$3.2 million of valuation allowance associated with the Company's foreign subsidiaries and \$2.6 million associated with the AMT refund related to the TCJA. As of December 31, 2017, the Company had a valuation allowance of \$77.8 million against all of its U.S. federal, California and other state net deferred tax assets, including net operating loss carryforwards and R&D tax credit carryforwards, and against the majority of its foreign deferred tax assets.

The Company adopted ASU No. 2016-09, Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting, using a modified-retrospective transition method, in the first quarter of fiscal 2017. As a result, the Company recorded a cumulative effect of \$4.6 million of additional gross deferred tax asset associated with shared-based payment and an offsetting valuation allowance of the same amount, therefore resulting in no net impact to the Company's beginning retained earnings or effective tax rate for 2017.

In October 2016, the FASB issued ASU No. 2016-16, Income Taxes (topic 740): Intra-Entity Transfers of Assets Other Than Inventory, which requires companies to recognize the income tax consequences of all intra-entity sales of assets other than inventory when they occur. As a result, a reporting entity would recognize the tax expense from the sale of the asset in the seller's tax jurisdiction when the transfer occurs, even though the pre-tax effects of that transaction are eliminated in

consolidation. Any deferred tax asset that arises in the buyer’s jurisdiction would also be recognized at the time of the transfer. The Company early adopted this ASU during the first quarter of fiscal 2017 on a modified retrospective approach and recorded a cumulative-effect adjustment of \$1.4 million to the retained earnings as of January 1, 2017 (which reduced the accumulated deficit). Correspondingly, in the first quarter of fiscal 2017, the Company recognized an additional \$1.1 million of net deferred tax assets, after netting with \$2.1 million of valuation allowance, and write off the remaining \$0.3 million of unamortized tax expenses deferred under the previous guidance to provision for income taxes in the first quarter of fiscal 2017.

On July 27, 2015, the U.S. Tax Court issued an opinion in *Altera Corp. v. Commissioner*, 145 T.C. No.3 (2015) related to the treatment of stock-based compensation expense in an intercompany cost-sharing arrangement. A final decision was entered by the U.S. Tax Court on December 1, 2015. On February 19, 2016, the U.S. Internal Revenue Service filed a notice of appeal in *Altera Corp. v. Commissioner*, 145 T.C. No. 3 (2015), to the Ninth Circuit Court of Appeal. The Ninth Circuit will decide whether a regulation that mandates that stock-based compensation costs related to the intangible development activity of a qualified cost sharing arrangement (a “QCSA”) must be included in the joint cost pool of the QCSA (the “all costs rule”) is consistent with the arm’s length standard as set forth in Section 482 of the Internal Revenue Code. The Company concluded that no adjustment to the consolidated financial statements as of December 31, 2016 and 2017 is appropriate at this time due to the uncertainties with respect to the ultimate resolution of this case.

As of December 31, 2017, the Company had \$111.4 million, \$49.1 million, \$25.4 million and \$53.2 million of foreign, U.S. federal, U.S. California state, and U.S. other states net operating loss carryforwards (“NOL”), respectively. There is no expiration to the utilization of the foreign NOL, while the U.S. federal and California NOL will begin to expire at various dates beginning in 2018 through 2037, if not utilized.

As of December 31, 2017, the Company had U.S. federal and California state tax credit carryforwards of approximately \$11.3 million and \$33.9 million, respectively. If not utilized, the U.S. federal tax credit carryforwards will begin to expire in 2031, while the California tax credit forward will not expire.

The Company has not provided U.S. federal and California state income taxes, as well as foreign withholding taxes, on approximately \$10.5 million of cumulative undistributed earnings for certain non-U.S. subsidiaries, because such earnings are intended to be indefinitely reinvested. Determination of the amount of unrecognized deferred tax liability for temporary differences related to investment in these non-U.S. subsidiaries that are essentially permanent in duration is not practicable.

The Company applies the provisions of the applicable accounting guidance regarding accounting for uncertainty in income taxes, which requires application of a more-likely-than-not threshold to the recognition and derecognition of uncertain tax positions. If the recognition threshold is met, the applicable accounting guidance permits the recognition of a tax benefit measured at the largest amount of such tax benefit that, in our judgment, is more than fifty percent likely to be realized upon settlement. It further requires that a change in judgment related to the expected ultimate resolution of uncertain tax positions be recognized in earnings in the period in which such determination is made. The Company will continue to review its tax positions and provide for, or reverse, unrecognized tax benefits as issues arise. As of December 31, 2017, the Company had \$18.8 million that would favorably impact the effective tax rate in future periods if recognized. The following table summarizes the activity related to the Company’s gross unrecognized tax benefits (in millions):

	Year ended December 31,		
	2017	2016	2015
Balance at beginning of period	\$ 19.2	\$ 15.6	\$ 15.7
Increase in balance related to tax positions taken during current year	1.4	4.6	0.7
Decrease in balance as a result of a lapse of the applicable statutes of limitations	(2.2)	(1.0)	(0.9)
Increase in balance related to tax positions taken during prior years	1.8	—	0.3
Decrease in balance related to tax positions taken during prior years	(1.4)	—	(0.2)
Balance at end of period	<u>\$ 18.8</u>	<u>\$ 19.2</u>	<u>\$ 15.6</u>

The Company recognizes interest and penalties related to unrecognized tax positions in income tax expenses on the Consolidated Statements of Operations. The net interest and penalties charges recorded for the years ended December 31, 2015 through 2017, were not material. The Company had approximately \$0.5 million of accrued interest and penalties related to uncertain tax positions as of December 31, 2017 and December 31, 2016.

The Company files U.S. federal, state, and foreign income tax returns in jurisdictions with varying statutes of limitations during which such tax returns may be audited and adjusted by the relevant tax authorities. In 2016, the U.S. Internal Revenue Service concluded its audit for the Company’s 2012 tax year. As a result, the Company released \$1.1 million of related tax reserves, including accrued interests and penalties in 2016.

The 2014 through 2016 tax years generally remain subject to examination by U.S. federal and most state tax authorities. In significant foreign jurisdictions, the 2007 through 2015 tax years generally remain subject to examination by their respective tax authorities. In addition, a subsidiary of the Company is under audit for the 2013 and 2016 tax years, by the Israel tax authority. If, upon the conclusion of these audits, the ultimate determination of taxes owed in the United States or Israel is for an amount in excess of the tax provision the Company has recorded in the applicable period, the Company's overall tax expense, effective tax rate, operating results and cash flow could be materially and adversely impacted in the period of adjustment.

The Company's operations in Switzerland are subject to a reduced tax rate under the Switzerland tax holiday which requires various thresholds of investment and employment in Switzerland. The Company has met these various thresholds and the Switzerland tax holiday is effective through the end of 2018. The income tax benefits attributable to the Switzerland holiday were estimated to be approximately \$0.6 million for fiscal year 2017 and approximately \$0.7 million for each of the fiscal years 2016 and 2015, increasing diluted earnings per share by approximately \$0.007, \$0.008 and \$0.008 for each of the fiscal years 2017, 2016 and 2015, respectively.

NOTE 15: NET LOSS PER SHARE

Basic net loss per share is computed by dividing the net loss attributable to common stockholders for the applicable period by the weighted average number of common shares outstanding during the period. Potentially dilutive shares, consisting of outstanding stock options, restricted stock units, ESPP plan awards as well as the Notes, are excluded from the net loss per share computations when their effect is anti-dilutive.

The following table presents the calculation of basic and diluted net loss per share (in thousands, except per share amounts):

	Year Ended December 31,		
	2017	2016	2015
Numerator:			
Net loss	\$ (82,955)	\$ (72,314)	\$ (15,661)
Denominator:			
Weighted average number of shares outstanding:			
Basic and diluted	80,974	77,705	87,514
Net loss per share:			
Basic and diluted	\$ (1.02)	\$ (0.93)	\$ (0.18)

The diluted net loss per share is the same as basic net loss per share for the years ended December 31, 2017, 2016 and 2015 because potential common shares are only considered when their effect would be dilutive. The following table presents the potential weighted common shares outstanding that were excluded from the computation of basic and diluted net loss per share calculations (in thousands):

	December 31,		
	2017	2016	2015
Stock options	4,470	5,295	6,460
Restricted stock units	3,059	2,536	2,178
Stock purchase rights under the ESPP	620	659	518
Warrants ⁽¹⁾	782	206	—
Total ⁽²⁾	8,931	8,696	9,156

(1) In 2016, in connection with the execution of a product supply agreement the Company granted Comcast a warrant to purchase shares of its common stock. (See Note 16, "Warrants" for additional information).

(2) Excluded from the table above are the Notes, which are convertible under certain conditions into an aggregate of 22,304,348 shares of common stock (see Note 11, "Convertible Notes, Other Debts and Capital Leases" for additional information on the Notes). Since the Company's intent is to settle the principal amount of the Notes in cash, the treasury stock

method is being used to calculate any potential dilutive effect of the conversion spread on diluted net income per share, if applicable. The conversion spread will have a dilutive impact on diluted net income per share when the Company's average market price of its common stock for a given period exceeds the conversion price of \$5.75 per share.

NOTE 16: WARRANTS

On September 26, 2016, the Company granted a warrant to purchase shares of common stock (the "Warrant") to Comcast pursuant to which Comcast may, subject to certain vesting provisions, purchase up to 7,816,162 shares of the Company's common stock subject to adjustment in accordance with the terms of the Warrant, for a per share exercise price of \$4.76. Comcast may exercise the Warrant for cash or on a net share basis. The Warrant expires on September 26, 2023 or the prior consummation of a change of control of the Company.

Comcast's right to purchase 781,617 shares vested as of the issuance date as an incentive to enter into the software license product supply agreement. Comcast's rights to purchase an additional 1,954,042 shares vest upon achievement of milestones that occur upon or prior to Comcast's election for enterprise license pricing for certain of the Company's software products. Such pricing would obligate Comcast to make certain total payments to the Company over the term of the product supply agreement. Comcast's rights to purchase an additional 1,172,425 shares vest when Comcast exceeds specified cumulative purchase amounts from the Company under the product supply agreement. Comcast's rights to purchase the remaining shares vest in specified tranches at the earlier of Comcast's enterprise license pricing election (if completed by a certain date) or achievement of specified cumulative purchase amounts from the Company.

Because the Warrant contains performance criteria under which Comcast must achieve for the Warrant to vest, the final measurement date for the Warrant is the date on which the Warrant vests. Prior to the final measurement, when achievement of the performance criteria has been deemed probable, the estimated fair value of the Warrant is recorded as a reduction to net revenue based on the projected number of shares underlying the Warrant that are expected to vest, the proportion of purchases by Comcast and its affiliates within the period relative to the aggregate purchase levels required for the Warrant to vest and the then-current fair value of the Warrant. To the extent that projections change as to the number of shares underlying the Warrant that will vest, fair market value of the Warrant changes, a cumulative catch-up adjustment is recorded in the period in which the estimates change.

The fair value of the Warrant is determined using the Black-Scholes option pricing model. The assumptions utilized in the Black-Scholes model include the risk-free interest rate, expected volatility, and expected life in years. The risk-free interest rate over the expected life is equal to the prevailing U.S. Treasury note rate over the same period. Expected volatility is determined utilizing historical volatility over a period of time equal to the expected life of the Warrant. Expected life is equal to the remaining contractual term of the Warrant. The dividend yield is assumed to be zero since we have not historically declared dividends and does not have any plans to declare dividends in the future.

A portion of the Warrant vested on September 26, 2016 and had a fair value of \$1.6 million. During the year ended December 31, 2017 and 2016, the Company recorded as a reduction to net revenues in connection with the Warrant of \$0.2 million and \$0.4 million, respectively. The remaining unamortized value of \$1.0 million is recorded as an asset under "Prepaid expenses and other current assets" on the Company's Consolidated Balance Sheet as of December 31, 2017.

NOTE 17: SEGMENT INFORMATION, GEOGRAPHIC INFORMATION AND CUSTOMER CONCENTRATION

Segment Information

Operating segments are defined as components of an enterprise that engage in business activities for which separate financial information is available and evaluated by the Company's CODM, which for the Company is its Chief Executive Officer, in deciding how to allocate resources and assess performance. Based on our internal reporting structure, the Company consists of two operating segments: Video and Cable Edge. The operating segments were determined based on the nature of the products offered. The Video segment sells video processing and production and playout solutions and services worldwide to broadcast and media companies, streaming new media companies, cable operators, and satellite and telecommunications (telco) Pay-TV service providers. The Cable Edge segment sells CableOS, cable edge solutions and related services to cable operators globally.

The Company does not allocate amortization of intangibles, stock-based compensation, restructuring and related charges, TVN acquisition- and integration-related costs, and certain other non-recurring charges to the operating income (loss) for each

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segment because management does not include this information in the measurement of the performance of the operating segments. A measure of assets by segment is not applicable as segment assets are not included in the discrete financial information provided to the CODM.

On February 29, 2016, the Company completed its acquisition of 100% of the outstanding equity of TVN and assigned TVN to its Video operating segment.

The following table provides summary financial information by reportable segment (in thousands):

	Year ended December 31,		
	2017 ⁽¹⁾	2016	2015
Video			
Revenue	\$ 319,473	\$ 351,489	\$ 291,779
Gross profit	173,414	194,044	167,573
Operating income (loss)	(2,024)	11,963	13,529
Cable Edge			
Revenue	\$ 38,773	\$ 54,422	\$ 85,248
Gross profit	8,892	21,174	37,832
Operating loss	(23,154)	(12,131)	(1,599)
Total			
Revenue	\$ 358,246	\$ 405,911	\$ 377,027
Gross profit	182,306	215,218	205,405
Operating income (loss)	(25,178)	(168)	11,930

(1) The Company has historically employed an aggregate allocation methodology based on total revenues to attribute professional services revenue and sales expenses between its Video and Cable Edge segments. Beginning in the fourth quarter of 2017, the Company has prospectively changed to a more precise attribution methodology as the activities of selling and supporting the CableOS solution have become increasingly distinct from those of Video solutions. The impact of making this change in the fourth quarter of 2017 compared to the Company's historical approach was a reduction in operating income of \$2.4 million from the Video segment and a corresponding increase to the operating income of the Cable Edge segment. The Company believes that the updated allocation methodology will provide greater clarity regarding the operating metrics of the Video and Cable Edge business segments.

A reconciliation of the Company's consolidated segment operating income (loss) to consolidated loss before income taxes is as follows (in thousands):

	Year ended December 31,		
	2017 ⁽¹⁾	2016	2015
Total segment operating income (loss)	\$ (25,178)	\$ (168)	\$ 11,930
Unallocated corporate expenses ⁽¹⁾	(20,767)	(38,972)	(2,794)
Stock-based compensation	(16,610)	(13,060)	(15,582)
Amortization of intangibles	(8,322)	(14,836)	(6,502)
Consolidated loss from operations	(70,877)	(67,036)	(12,948)
Non-operating expense, net	(13,830)	(13,394)	(3,120)
Loss before income taxes	\$ (84,707)	\$ (80,430)	\$ (16,068)

(1) For the years ended December 31, 2017 and 2016, the unallocated corporate expenses included TVN acquisition- and integration-related costs, TVN VDP costs (see Note 10, "Restructuring and Related charges-TVN VDP," for more information on TVN VDP) and Cable Edge product line inventory obsolescence costs, totaling \$7.9 million and \$32.2 million, respectively. In addition, in fiscal year 2017, the unallocated corporate expenses included \$8.0 million of Avid litigation settlement cost and associated legal fees (see Note 19, "Legal Proceedings," for more information). The remaining unallocated corporate expenses for all years presented above include primarily other restructuring charges and excess facilities charges.

Geographic Information

The geographic distribution of Harmonics' revenue and property and equipment, net is summarized in the tables below (in thousands):

	Year ended December 31,		
	2017	2016	2015
Net revenue ⁽¹⁾ :			
United States	\$ 131,773	\$ 171,016	\$ 175,466
Other countries	226,473	234,895	201,561
Total	<u>\$ 358,246</u>	<u>\$ 405,911</u>	<u>\$ 377,027</u>

(1) Revenue is attributed to countries based on the location of the customer.

Other than the U.S., no single country accounted for 10% or more of the Company's net revenues for the years ended December 31, 2017, 2016 and 2015.

	As of December 31,	
	2017	2016
Property and equipment, net:		
United States	\$ 13,786	\$ 15,197
Israel	8,904	9,966
France	4,573	4,872
Other countries	2,002	2,129
Total	<u>\$ 29,265</u>	<u>\$ 32,164</u>

Customer Concentration

During the years ended December 31, 2017 and 2016, no single customer accounted for more than 10% of our net revenue. Net revenue from Comcast accounted for 12% of the Company's total net revenue during the year ended December 31, 2015. Other than Comcast, no single customer accounted for 10% or more of the Company's total net revenue for fiscal year 2015.

NOTE 18: COMMITMENTS AND CONTINGENCIES

Leases

The Company leases its facilities under non-cancelable operating leases which expire at various dates through June 2028. In addition, the Company leases vehicles and phones in Israel under non-cancelable operating leases, the last of which expires in 2020. Total rent expense related to these operating leases was \$10.2 million, \$9.7 million and \$9.0 million for the years ended December 31, 2017, 2016 and 2015, respectively. Future minimum lease payments under non-cancellable operating leases at December 31, 2017, are as follows (in thousands):

Year ending December 31,	Operating Leases
2018	\$ 13,534
2019	12,132
2020	8,716
2021	2,958
2022	2,497
Thereafter	9,145
Total minimum payments	<u>\$ 48,982</u>

Warranty

The Company accrues for estimated warranty costs at the time of product shipment. Management periodically reviews the estimated warranty liability and records adjustments based on the terms of warranties provided to customers, historical and anticipated warranty claims experience, and estimates of the timing and cost of warranty claims. Activities for the Company's

warranty accrual for each fiscal year, which is included in accrued and other current liabilities, is summarized below (in thousands):

	2017	2016	2015
Balance at beginning of period	\$ 4,862	\$ 3,913	\$ 4,242
Accrual for current period warranties	5,117	5,482	5,378
Balance assumed from TVN acquisition	—	1,012	—
Warranty costs incurred	(5,598)	(5,545)	(5,707)
Balance at end of period	<u>\$ 4,381</u>	<u>\$ 4,862</u>	<u>\$ 3,913</u>

Bank Guarantees and standby Letters of Credit

As of December 31, 2017, the Company has outstanding bank guarantees and standby letters of credit in aggregate of \$2.7 million, consisting primarily of \$1.4 million for a building lease for the TVN French Subsidiary and \$0.5 million for a credit card facility, and the remainder mainly related to performance bonds issued to customers.

During 2017, one of the Company's subsidiaries entered into a \$2.0 million credit facility with a foreign bank for the purpose of issuing performance guarantees. The credit facility is secured by a \$2.2 million indemnity issued by the parent company. There were no amounts outstanding under this credit facility as of December 31, 2017.

Indemnification

The Company is obligated to indemnify its officers and its directors pursuant to its bylaws and contractual indemnity agreements. The Company also indemnifies some of its suppliers and most of its customers for specified intellectual property matters pursuant to certain contractual arrangements, subject to certain limitations. The scope of these indemnities varies, but, in some instances, includes indemnification for damages and expenses (including reasonable attorneys' fees). There have been no amounts accrued in respect of the indemnification provisions through December 31, 2017.

Royalties

The Company has licensed certain technologies from various companies. It incorporates these technologies into its own products and is required to pay royalties for such use, usually based on shipment of the related products. In addition, the Company has obtained research and development grants under various Israeli government programs that require the payment of royalties on sales of certain products resulting from such research. Royalty expenses were \$5.2 million, \$4.1 million and \$2.9 million for the years ended December 31, 2017, 2016 and 2015, respectively, and they are included in product cost of revenue in the Company's Consolidated Statements of Operations.

Purchase Obligations

The Company relies on a limited number of contract manufacturers and suppliers to provide manufacturing services for a substantial majority of its products. Obligations to purchase inventory and other commitments are generally expected to be fulfilled within one year. The Company had approximately \$40.2 million of non-cancelable commitments to purchase inventories and other commitments as of December 31, 2017. The Company recognized \$3.8 million of net losses on firm inventory purchase commitments as of December 31, 2017.

NOTE 19: LEGAL PROCEEDINGS

In October 2011, Avid Technology, Inc. ("Avid") filed a complaint in the United States District Court for the District of Delaware alleging that Harmonic's Media Grid product infringes two patents held by Avid. A jury trial on this complaint commenced on January 23, 2014 and, on February 4, 2014, the jury returned a unanimous verdict in favor of us, rejecting Avid's infringement allegations in their entirety. In January 2015, Avid filed an appeal with respect to the jury's verdict with the Federal Circuit. In January 2016, the Federal Circuit issued an order vacating the verdict of noninfringement and remanding the case to the trial court for a new trial on infringement.

In June 2012, Avid served a subsequent complaint in the United States District Court for the District of Delaware alleging that the Company's Spectrum product infringes one patent held by Avid. The complaint sought injunctive relief and unspecified damages. In September 2013, the U.S. Patent Trial and Appeal Board ("PTAB") authorized an inter partes review to be instituted as to claims 1-16 of the patent asserted in this second complaint. In July 2014, the PTAB issued a decision finding claims 1-10 invalid and claims 11-16 not invalid. We filed an appeal with respect to the PTAB's decision on claims 11-16 in September 2014, and the Federal Circuit affirmed the PTAB's decision in April 2016.

In July 2017, the court issued a scheduling order consolidating both cases and setting the trial date for November 6, 2017.

On October 19, 2017, the parties agreed to settle the consolidated cases by entering into a settlement and patent portfolio cross-license agreement, and the cases were dismissed with prejudice. In connection with the agreement, the Company recorded a \$6.0 million litigation settlement expense in “Selling, general and administrative expenses” in the Company’s 2017 Consolidated Statement of Operations. Of the associated \$6.0 million settlement liability, \$2.5 million was paid in October 2017 and the remaining \$1.5 million and \$2.0 million will be paid in the second quarter of 2019 and the third quarter of 2020, respectively.

From time to time, the Company is involved in lawsuits as well as subject to various legal proceedings, claims, threats of litigation, and investigations in the ordinary course of business, including claims of alleged infringement of third-party patents and other intellectual property rights, commercial, employment, and other matters. The Company assesses potential liabilities in connection with each lawsuit and threatened lawsuits and accrues an estimated loss for these loss contingencies if both of the following conditions are met: information available prior to issuance of the financial statements indicates that it is probable that a liability has been incurred at the date of the financial statements and the amount of loss can be reasonably estimated. While certain matters to which the Company is a party specify the damages claimed, such claims may not represent reasonably probable losses. Given the inherent uncertainties of litigation, the ultimate outcome of these matters cannot be predicted at this time, nor can the amount of possible loss or range of loss, if any, be reasonably estimated.

NOTE 20: SUBSEQUENT EVENT

Harmonic 2018 Restructuring

To better align the Company’s resources and strategic goals, in the first quarter of 2018, the Company committed to a new restructuring plan (the “Harmonic 2018 Restructuring Plan”). The restructuring activities under this plan primarily include workforce reductions of the company worldwide. The estimated cost for implementing this plan is approximately \$1.7 million. The restructuring activities under this plan will commence in the first quarter of 2018 and are expected to continue into the second quarter of 2018.

NOTE 21: SELECTED QUARTERLY FINANCIAL DATA

(UNAUDITED, IN THOUSANDS, EXCEPT PER SHARE AMOUNTS)

The following table sets forth our unaudited quarterly Consolidated Statement of Operations data for each of the eight quarters ended December 31, 2017. In management’s opinion, the data has been prepared on the same basis as the audited Consolidated Financial Statements included in this report, and reflects all necessary adjustments, consisting only of normal recurring adjustments, necessary for a fair statement of this data.

	Fiscal 2017			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
	(In thousands, except per share amounts)			
Quarterly Data:				
Net revenue	\$ 82,943	\$ 82,315	\$ 92,014	\$ 100,974
Gross profit ⁽⁴⁾	40,408	33,815	47,025	48,572
Net loss ^{(2) (5) (6)}	\$ (24,027)	\$ (31,500)	\$ (15,583)	\$ (11,516)
Net loss per share:				
Basic and diluted	\$ (0.30)	\$ (0.39)	\$ (0.19)	\$ (0.14)
Shares used in per share calculations:				
Basic and diluted	79,810	80,590	81,445	82,014
	Fiscal 2016 ⁽¹⁾			
	1st Quarter ⁽⁶⁾	2nd Quarter	3rd Quarter	4th Quarter ⁽³⁾
	(In thousands, except per share amounts)			
Quarterly Data:				
Net revenue	\$ 81,832	\$ 109,571	\$ 101,406	\$ 113,102
Gross profit	40,654	51,040	51,363	57,693
Net loss ^{(2) (5) (6)}	\$ (25,180)	\$ (20,679)	\$ (16,012)	\$ (10,443)
Net loss per share:				
Basic and diluted	\$ (0.33)	\$ (0.27)	\$ (0.21)	\$ (0.13)
Shares used in per share calculations:				
Basic and diluted	76,996	77,342	78,092	78,389

(1) On February 29, 2016, the Company completed the acquisition of TVN and applied the acquisition method of accounting for the business combination. The selected quarterly financial data for the year ended December 31, 2016 of the combined entity includes 10 months of operating results of TVN beginning March 1, 2016.

(2) As a result of the TVN acquisition, in 2016 and 2017, the Company incurred acquisition- and integration-related expenses of \$3.0 million, \$3.4 million, \$5.3 million and \$5.2 million, in the first through fourth quarter of 2016, respectively, and \$2.2 million, \$0.5 million, \$0.1 million and \$0.1 million in the first through fourth quarter of 2017. These costs consisted of acquisition-related costs which include outside legal, accounting and other professional services as well as integration-related costs which include incremental costs resulting from the TVN acquisition that are not expected to generate future benefits once the integration is fully consummated. These costs are expensed as incurred and the Company does not expect to incur any TVN acquisition- and integration-related expenses after 2017.

(3) In 2016, as part of the TVN integration plan, the Company established the TVN VDP to enable the French employees of TVN to voluntarily terminate with certain benefits. The Company recorded a charge of \$13.1 million for TVN VDP in the fourth quarter of 2016.

(4) Gross margin decreased to 41.1% in the second quarter of 2017 compared to 48.7% in the first quarter of 2017, primarily due to lower service margins and higher inventory obsolescence charges for the Company's legacy broadcast video inventory due to reduced demand, as well as higher inventory obsolescence charge for our older Cable Edge product lines. The factors negatively impacting the gross margin in the second quarter of 2017 were mostly absent in the third quarter of 2017, and together with a more favorable product mix, the gross margin increased to 51.1% in the third quarter of 2017 compared to 41.1% in the second quarter of 2017. Gross margin increased to 50.7% in the third quarter of 2016 compared to 46.6% in the second quarter of 2016 primarily due to the absence of the Cable Edge inventory obsolescence charge in the third quarter of 2016.

(5) In the fourth quarter of 2016 and 2017, the Company recorded additional valuation allowances of \$18.3 and \$9.0 million against all of the U.S. deferred tax assets, respectively. These increases in valuation allowances were offset partially by the release of \$8.4 million and \$5.8 million in the fourth quarter of 2016 and 2017, respectively, of valuation allowances associated with the Company's foreign subsidiaries, including a one-time benefit associated with the alternative minimum tax refund related to the TCJA in the fourth quarter of 2017.

(6) In the first and third quarter of 2016 and the fourth quarter of 2017, the Company recorded impairment charges of \$1.5 million, \$1.2 million, and \$0.5 million, respectively, for its investment in Vislink. (See Note 3, "Investments in Other Equity Securities," of the notes to the Consolidated Financial Statements for additional information).

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

We maintain “disclosure controls and procedures,” as such term is defined in Rule 13a-15(e) under the Exchange Act, that are designed to ensure that information required to be disclosed by us in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in SEC rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure. In designing and evaluating our disclosure controls and procedures, management recognized that disclosure controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the disclosure controls and procedures are met. Additionally, in designing disclosure controls and procedures, our management necessarily was required to apply its judgment in evaluating the cost-benefit relationship of possible disclosure controls and procedures. The design of any disclosure controls and procedures also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions.

Based on their evaluation as of the end of the period covered by this Annual Report on Form 10-K, our Chief Executive Officer and Chief Financial Officer have concluded that our disclosure controls and procedures were effective.

Management’s Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act). Management conducted an assessment of the effectiveness of the Company’s internal control over financial reporting based on the criteria set forth in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on the Company’s assessment, management concluded that its internal control over financial reporting was effective as of December 31, 2017.

The Company’s independent registered public accounting firm, PricewaterhouseCoopers LLP, has audited the effectiveness of the Company’s internal control over financial reporting, as stated in their report which appears in Part II, Item 8 of this Form 10-K.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during our fourth quarter of fiscal year 2017, which were identified in connection with management’s evaluation required by paragraph (d) of rules 13a-15 and 15d-15 under the Exchange Act, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. OTHER INFORMATION

None.

PART III

Certain information required by Part III is omitted from this Annual Report on Form 10-K pursuant to Instruction G to Exchange Act Form 10-K, and the Registrant will file its definitive Proxy Statement for its 2018 Annual Meeting of Stockholders, pursuant to Regulation 14A of the Securities Exchange Act of 1934, as amended (the “2018 Proxy Statement”), not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, and certain information included in the 2018 Proxy Statement is incorporated herein by reference.

Item 10. *DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE*

The information required by this item will be set forth in the 2018 Proxy Statement and is incorporated herein by reference.

Harmonic has adopted a Code of Business Conduct and Ethics for Senior Operational and Financial Leadership (the “Code”), which applies to its Chief Executive Officer, its Chief Financial Officer, its Corporate Controller and other senior operational and financial management. The Code is available on the Company’s website at www.harmonicinc.com.

Harmonic intends to satisfy the disclosure requirement under Form 8-K regarding an amendment to, or waiver from, a provision of this Code of Ethics by posting such information on our website, at the address specified above, and, to the extent required by the listing standards of The NASDAQ Global Select Market, by filing a Current Report on Form 8-K with the Securities and Exchange Commission disclosing such information.

Item 11. *EXECUTIVE COMPENSATION*

The information required by this item will be set forth in the 2018 Proxy Statement and is incorporated herein by reference.

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

Information related to security ownership of certain beneficial owners and security ownership of management and related stockholder matters will be set forth in the 2018 Proxy Statement and is incorporated herein by reference.

Item 13. *CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE*

The information required by this item will be set forth in the 2018 Proxy Statement and is incorporated herein by reference.

Item 14. *PRINCIPAL ACCOUNTING FEES AND SERVICES*

The information required by this item will be set forth in the 2018 Proxy Statement and is incorporated herein by reference.

PART IV

Item 15. *EXHIBITS AND FINANCIAL STATEMENT SCHEDULES*

1. *Financial Statements.* See Index to Consolidated Financial Statements in Item 8 on page of this Annual Report on Form 10-K.

2. *Financial Statement Schedules.* Financial statement schedules have been omitted because the information is not required to be set forth herein, is not applicable or is included in the financial statements or the notes thereto.

3. *Exhibits.* The documents listed in the Exhibit Index of this Annual Report on Form 10-K are filed herewith or are incorporated by reference in this Annual Report on Form 10-K, in each case as indicated therein.

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Exhibit Number	Description
3.1(ii)	Certificate of Incorporation of Harmonic Inc., as amended
3.2	Amended and Restated Bylaws of Harmonic Inc.
4.1(i)	Form of Common Stock Certificate
4.2(iii)	Certificate of Designation of Rights, Preferences and Privileges of Series A Participating Preferred Stock of Harmonic Inc.
4.3(x)	Indenture, dated December 14, 2015, by and between the Company and U.S. Bank National Association
4.4(x)	Form of 4.00% Senior Convertible Note due 2020 (included in Exhibit 4.3)
4.5(xi)†	Warrant to Purchase Shares of Common Stock of Harmonic, Inc.
10.1(i)*	Form of Indemnification Agreement
10.2(viii)*	1995 Stock Plan, as amended and restated on June 13, 2017
10.3(viii)*	2002 Director Stock Plan, as amended and restated on June 13, 2017
10.4(viii)*	2002 Employee Stock Purchase Plan, as amended and restated on June 13, 2017
10.5(iv)*	Amended and Restated Change of Control Severance Agreement between Harmonic Inc. and Patrick Harshman, effective September 25, 2017
10.6(iv)*	Amended and Restated Change of Control Severance Agreement between Harmonic Inc. and Neven Haltmayer, effective September 25, 2017
10.7(iv)*	Amended and Restated Change of Control Severance Agreement between Harmonic Inc. and Nimrod Ben-Natan, effective September 25, 2017
10.8(viii)*	Harmonic Inc. 2002 Director Stock Plan Restricted Stock Unit Agreement
10.9(v)	Professional Service Agreement between Harmonic Inc. and Plexus Services Corp., dated September 22, 2003
10.10(v)	Amendment, dated January 6, 2006, to the Professional Services Agreement for Manufacturing between Harmonic Inc. and Plexus Services Corp., dated September 22, 2003
10.11(v)	Addendum 1, dated November 26, 2007, to the Professional Services Agreement between Harmonic Inc. and Plexus Services Corp., dated September 22, 2003
10.12	Harmonic Inc. 1995 Stock Plan Restricted Stock Unit Agreement
10.13(vi)	Lease Agreement between Harmonic Inc. and CRP North First Street, L.L.C. dated December 15, 2009
10.14(iv)*	Amended and Restated Change of Control Severance Agreement between Harmonic Inc. and Sanjay Kalra, effective September 25, 2017
10.15(vii)*	Amended and Restated Loan and Security Agreement, dated as of December 18, 2017, by and among Harmonic Inc., Harmonic International AG and Silicon Valley Bank
10.16 (ix)	Purchase Agreement, dated as of December 8, 2015, by and between Harmonic Inc. and Merrill Lynch, Pierce, Fenner & Smith Incorporated
10.17(xiii)	Put Option Agreement, dated as of December 7, 2015, by and between Harmonic Inc. and Mr. Eric Louvet, Mr. Eric Gallier, Mr. Jean-Marc Guiot, Mr. Claude Perron, Mrs. Crystele Trévisan-Jallu, Mrs. Delphine Sauvion, Mr. Marc Procureur, Mr. Christophe Delahousse, Mr. Hervé Congard, Mr. Arnaud de Puyfontaine, FPCI Winch Capital 3, Montalivet Networks and FPCI CIC Mezzanine 3
10.18(xiii)	Sale and Purchase Agreement, dated as of February 11, 2016, by and between Harmonic International AG and Mr. Eric Louvet, Mr. Eric Gallier, Mr. Jean-Marc Guiot, Mr. Claude Perron, Mrs. Crystele Trévisan-Jallu, Mrs. Delphine Sauvion, Mr. Marc Procureur, Mr. Christophe Delahousse, Mr. Hervé Congard, Mr. Arnaud de Puyfontaine, FPCI Winch Capital 3, Montalivet Networks and FPCI CIC Mezzanine 3 for the acquisition of Thomson Video Networks

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- 10.19(xii) [Registration Rights Agreement, dated September 26, 2016, by and between the Company and Comcast.](#)
- 21.1 [Subsidiaries of Harmonic Inc.](#)
- 23.1 [Consent of Independent Registered Public Accounting Firm](#)
- 31.1 [Certification of Principal Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002](#)
- 31.2 [Certification of Principal Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002](#)
- 32.1 [Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002](#)
- 32.2 [Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002](#)
- 101 The following materials from Registrant’s Annual Report on Form 10-K for the year ended December 31, 2017, formatted in Extensible Business Reporting Language (XBRL) includes: Consolidated Balance Sheets at December 31, 2017 and December 31, 2016; (ii) Consolidated Statements of Operations for the Years Ended December 31, 2017, December 31, 2016 and December 31, 2015; (iii) Consolidated Statements of Comprehensive Loss for the Years Ended December 31, 2017, December 31, 2016 and December 31, 2015; (iv) Consolidated Statements of Stockholders’ Equity for the Years Ended December 31, 2017, December 31, 2016 and December 31, 2015; (v) Consolidated Statements of Cash Flows for the Years Ended December 31, 2017, December 31, 2016 and December 31, 2015; and (vi) Notes to Consolidated Financial Statements.
- * Indicates a management contract or compensatory plan or arrangement relating to executive officers or directors of the Company.
- † Registrant has omitted portions of this exhibit and filed such exhibit separately with the Securities and Exchange Commission pursuant to a grant of confidential treatment under Rule 406 promulgated under the Securities Act.
- (i) Previously filed as an Exhibit to the Company’s Registration Statement on Form S-1 No. 33-90752.
- (ii) Previously filed as an Exhibit to the Company’s Annual Report on Form 10-K for the year ended December 31, 2001.
- (iii) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated July 25, 2002.
- (iv) Previously filed as an Exhibit to the Company’s Quarterly Report on Form 10-Q for the quarter ended September 30, 2017.
- (v) Previously filed as an Exhibit to the Company’s Current Annual Report on Form 10-K for the year ended December 31, 2008.
- (vi) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated December 18, 2009.
- (vii) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated December 21, 2017.
- (viii) Previously filed as an Exhibit to the Company’s Registration Statement on Form S-8, dated June 22, 2017.
- (ix) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated December 7, 2015.
- (x) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated December 14, 2015.
- (xi) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated September 26, 2016.
- (xii) Previously filed as an Exhibit to the Company’s Current Report on Form 8-K dated September 26, 2016.
- (xiii) Previously filed as an Exhibit to the Company’s Annual Report on Form 10-K for the year ended December 31, 2016.

Item 16. FORM 10-K SUMMARY

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15 (d) of the Securities Exchange Act of 1934, the Registrant, Harmonic Inc., a Delaware corporation, has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of San Jose, State of California, on March 5, 2018.

HARMONIC INC.By: /s/ PATRICK J. HARSHMAN

Patrick J. Harshman

President and Chief Executive Officer

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

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ PATRICK J. HARSHMAN</u> (Patrick J. Harshman)	President & Chief Executive Officer (Principal Executive Officer)	March 5, 2018
<u>/s/ SANJAY KALRA</u> (Sanjay Kalra)	Chief Financial Officer (Principal Financial and Accounting Officer)	March 5, 2018
<u>/s/ PATRICK GALLAGHER</u> (Patrick Gallagher)	Chairman	March 5, 2018
<u>/s/ E. FLOYD KVAMME</u> (E. Floyd Kvamme)	Director	March 5, 2018
<u>/s/ WILLIAM REDDERSEN</u> (William Reddersen)	Director	March 5, 2018
<u>/s/ SUSAN G. SWENSON</u> (Susan G. Swenson)	Director	March 5, 2018
<u>/s/ MITZI REAUGH</u> (Mitzi Reaugh)	Director	March 5, 2018
<u>/s/ NIKOS THEODOSOPOULOS</u> (Nikos Theodosopoulos)	Director	March 5, 2018
<u>/s/ DAVID KRALL</u> (David Krall)	Director	March 5, 2018

**AMENDED AND RESTATED
BYLAWS
OF
HARMONIC INC.
(a Delaware corporation)**

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AMENDED AND RESTATED

BYLAWS

OF

**HARMONIC INC.
(a Delaware corporation)**

ARTICLE I

CORPORATE OFFICES

1.1 REGISTERED OFFICE

The registered office of the corporation shall be fixed in the certificate of incorporation of the corporation.

1.2 OTHER OFFICES

The board of directors may at any time establish branch or subordinate offices at any place or places where the corporation is qualified to do business.

ARTICLE II

MEETINGS OF STOCKHOLDERS

2.1 PLACE OF MEETINGS

Meetings of stockholders shall be held at any place within or outside the State of Delaware designated by the board of directors. In the absence of any such designation, stockholders' meetings shall be held at the principal executive office of the corporation.

2.2 ANNUAL MEETING

The annual meeting of stockholders shall be held each year on a date and at a time designated by the board of directors. In the absence of such designation, the annual meeting of stockholders shall be held on the first Tuesday in May in each year at 9:00 a.m. However, if such day falls on a legal holiday, then the meeting shall be held at the same time and place on the next succeeding full business day. At the meeting, directors shall be elected, and any other proper business may be transacted.

2.3 SPECIAL MEETING

A special meeting of the stockholders may be called at any time by the board of directors, the chairman of the board of directors, or by the president, but such special meetings may not be called by any other person or persons except as otherwise required by General Corporation Law of Delaware or Section 3.4 herein. Only such business shall be considered at a special meeting of stockholders as shall have been stated in the notice for such meeting.

2.4 NOTICE OF STOCKHOLDERS' MEETINGS

All notices of meetings of stockholders shall be sent or otherwise given in accordance with Section 2.5 of these bylaws not less than ten (10) nor more than sixty (60) days before the date of the meeting. The notice shall specify the place, date and hour of the meeting and (i) in the case of a special meeting, the purpose or purposes for which the meeting is called (no business other than that specified in the notice may be transacted) or (ii) in the case of the annual meeting, those matters which the board of directors, at the time of giving the notice, intends to present for action by the stockholders (but any proper matter may be presented at the meeting for such action). The notice of any meeting at which directors are to be elected shall include the name of any nominee or nominees who, at the time of the notice, the board intends to present for election. Any previously scheduled meeting of the stockholders may be postponed, and (unless the certificate of incorporation otherwise provides) any special meeting of the stockholders may be cancelled, by resolution of the board of directors upon public notice given prior to the date previously scheduled for such meeting of stockholders.

2.5 ADVANCE NOTICE OF STOCKHOLDER NOMINEES AND STOCKHOLDER BUSINESS

(a) To be properly brought before an annual meeting or special meeting, nominations for the election of directors or other business must be (i) specified in the notice of meeting (or any supplement thereto) given by or at the direction of the board of directors, (ii) otherwise properly brought before the meeting by or at the direction of the board of directors or (iii) otherwise properly brought before the meeting by a stockholder who (x) is a stockholder of record at the time of the giving of notice required by this Section 2.5 and on the record date for the determination of stockholders entitled to vote at the meeting and (y) has timely complied in proper written form with the notice procedures set forth in this Section 2.5. In addition, for business to be properly brought before an annual meeting by a stockholder, such business must be a proper matter for stockholder action pursuant to these bylaws and applicable law. Except as otherwise required by General Corporation Law of Delaware or Section 3.4 herein, stockholders may not bring business before a special meeting of stockholders.

(b) For business to be properly brought before an annual meeting by a stockholder, the stockholder must have given timely notice thereof in proper written form to the Secretary of the corporation. To be timely, a stockholder's notice must be received by the Secretary at the principal executive offices of the corporation not less than sixty (60) calendar days nor earlier than ninety (90) calendar days before the one-year anniversary of the date of the preceding year's

annual meeting of stockholders; provided, however, that in the event that no annual meeting was held in the preceding year or the date of the annual meeting has been changed by more than thirty (30) days from the date of the preceding year's annual meeting, then notice by the stockholder to be timely must be so received not later than the close of business on the later of (i) ninety (90) calendar days prior to such annual meeting, or (ii) ten (10) calendar days following the day on which Public Announcement (as defined below) of the date of such annual meeting is first made. In no event shall any adjournment or postponement of an annual meeting or the announcement thereof commence a new time period for the giving of a stockholder's notice as described in this Section 2.5. "Public Announcement" shall mean disclosure in a press release reported by the Dow Jones News Service, Associated Press or a comparable national news service or in a document publicly filed by the corporation with the Securities and Exchange Commission pursuant to Section 13, 14 or 15(d) of the Securities Exchange Act of 1934, as amended, or any successor thereto (the "1934 Act"). To be in proper written form, a stockholder's notice to the Secretary shall set forth as to each matter the stockholder proposes to bring before the annual meeting: (1) a brief description of the business desired to be brought before the annual meeting and the reasons for conducting such business at the annual meeting, (2) the name and address, as they appear on the corporation's books, of the stockholder proposing such business and any Stockholder Associated Person (as defined below), (3) the class and number of shares of the corporation which are held of record or are beneficially owned by the stockholder or any Stockholder Associated Person and any derivative positions held or beneficially held by the stockholder or any Stockholder Associated Person, (4) whether and the extent to which any hedging or other transaction or series of transactions has been entered into by or on behalf of such stockholder or any Stockholder Associated Person with respect to any securities of the corporation, and a description of any other agreement, arrangement or understanding (including any short position or any borrowing or lending of shares), the effect of which is to mitigate loss to, or manage the risk or benefit from share price changes for, or increase or decrease the voting power of, such stockholder or any Stockholder Associated Person with respect to any securities of the corporation, (5) any material interest of the stockholder or a Stockholder Associated Person in such business and (6) a statement whether either such stockholder or any Stockholder Associated Person will deliver a proxy statement and form of proxy to holders of at least the percentage of the corporation's voting shares required under applicable law to carry the proposal (such information provided and statements made as required by clauses (1) through (6) constitute a "Business Solicitation Statement"). In addition, to be in proper written form, a stockholder's notice to the Secretary must be supplemented not later than ten (10) calendar days following the record date to disclose the information contained in clauses (3) and (4) above as of the record date (the "Supplement"). For purposes of this Section 2.5, a "Stockholder Associated Person" of any stockholder shall mean (x) any person controlling, directly or indirectly, or acting in concert with, such stockholder, (y) any beneficial owner of shares of stock of the corporation owned of record or beneficially by such stockholder and on whose behalf the proposal or nomination, as the case may be, is being made, or (z) any person controlling, controlled by or under common control with such person referred to in the preceding clauses (x) and (y). Without exception, no business proposed by a stockholder shall be conducted at any annual meeting except in accordance with the procedures set forth in this Section 2.5. In addition, business proposed to be brought by a stockholder may not be brought before the annual meeting if such stockholder or a Stockholder Associated Person, as applicable, takes action contrary to the representations made in the Business Solicitation Statement

or if the Business Solicitation Statement contains an untrue statement of a material fact or omits to state a material fact necessary to make the statements therein not misleading. The chairperson of the annual meeting shall, if the facts warrant, determine and declare at the meeting that business was not properly brought before the meeting and in accordance with the provisions of this Section 2.5, and, if the chairperson should so determine, he or she shall so declare at the meeting that any such business not properly brought before the meeting shall not be transacted.

(c) Only persons who are nominated in accordance with the procedures set forth in this Section 2.5(c) shall be eligible for election as directors. Nominations of persons for election to the board of directors of the corporation may be made at an annual meeting of stockholders by or at the direction of the board of directors or by any stockholder of the corporation entitled to vote in the election of directors at the meeting who timely complies with the notice procedures set forth in this paragraph 2.5(c). To be timely, such nominations, other than those made by or at the direction of the board of directors, shall be made pursuant to the notice provisions of Section 2.5(b), and shall be in proper written form as set forth in this Section 2.5(c). Nominations of persons for election to the board of directors of the corporation may be made at a special meeting of stockholders by a stockholder (if the business to be conducted at such meeting, as specified in the notice described in Section 2.4(i), includes the election of directors) if the notice required by this Section 2.5(c) shall be delivered to the Secretary of the corporation not later than the close of business on the later of ninety (90) calendar days prior to such special meeting or ten (10) calendar days following the day on which Public Announcement (as defined above) is first made of the date of the special meeting and of the nominees proposed by the board of directors to be elected at such meeting. To be in proper written form, a stockholder's notice delivered pursuant to this Section 2.5(c) shall set forth (i) as to each person (a "nominee") whom the stockholder proposes to nominate for election or re-election as a director: (A) the name, age, business address and residence address of the nominee, (B) the principal occupation or employment of the nominee, (C) the class and number of shares of the corporation which are held of record or are beneficially owned by the nominee and any derivative positions held or beneficially held by the nominee, (D) whether and the extent to which any hedging or other transaction or series of transactions has been entered into by or on behalf of the nominee with respect to any securities of the corporation, and a description of any other agreement, arrangement or understanding (including any short position or any borrowing or lending of shares), the effect or intent of which is to mitigate loss to, or manage the risk or benefit from share price changes for, or increase or decrease the voting power of the nominee with respect to any securities of the corporation, (E) a description of all arrangements or understandings between the stockholder and each nominee and any other person or persons (naming such person or persons) pursuant to which the nominations are to be made by the stockholder, (F) a written statement executed by the nominee acknowledging that as a director of the corporation, the nominee will owe fiduciary duties under Delaware law with respect to the corporation and its stockholders, and (G) any other information relating to the nominee that would be required to be disclosed about such nominee if proxies were being solicited for the election of the nominee as a director, or is otherwise required, in each case pursuant to Regulation 14A under the 1934 Act (including without limitation the nominee's written consent to being named in the proxy statement, if any, as a nominee and to serving as a director if elected); and (ii) as to such stockholder giving notice, (x) the information required to be provided in a stockholder's notice pursuant to clauses (2) through (5) of Section 2.5(b) and the Supplement

referenced in Section 2.5(b) (except that the references to “business” in such Section 2.5(b) shall instead refer to nominations of directors for purposes of this Section 2.5(c)), and (y) a statement whether either such stockholder or Stockholder Associated Person will deliver a proxy statement and form of proxy to holders of a number of the corporation’s voting shares reasonably believed by such stockholder or Stockholder Associated Person to be necessary to elect such nominee(s) (such information provided and statements made as required by preceding clauses (i) and (ii) above constitute a “Nominee Solicitation Statement”). At the request of the board of directors, any person nominated by a stockholder for election as a director shall furnish to the Secretary of the corporation (1) that information required to be set forth in the stockholder’s Nominee Solicitation Statement as of a date subsequent to the date on which the notice of such person’s nomination was given and (2) such other information as may reasonably be required by the corporation to determine the eligibility of such proposed nominee to serve as independent director of the corporation or that could be material to a reasonable stockholder’s understanding of the independence, or lack thereof, of such nominee; in the absence of the furnishing of such information if requested, such stockholder’s nomination shall not be considered in proper form pursuant to this Section 2.5(c). Without exception, no person nominated by a stockholder shall be eligible for election or re-election as a director of the corporation unless nominated in accordance with the procedures set forth in this Section 2.5(c). In addition, a nominee shall not be eligible for election or re-election if a stockholder or Stockholder Associated Person, as applicable, takes action contrary to the representations made in the Nominee Solicitation Statement or if the Nominee Solicitation Statement contains an untrue statement of a material fact or omits to state a material fact necessary to make the statements therein not misleading. The chairperson of the meeting shall, if the facts warrant, determine and declare at the meeting that a nomination was not made in accordance with the procedures prescribed by these bylaws, and if the chairperson should so determine, he or she shall so declare at the meeting, and the defective nomination shall be disregarded.

(d) In addition to the foregoing provisions of this Section 2.5, a stockholder must also comply with all applicable requirements of state law and of the 1934 Act and the rules and regulations thereunder with respect to the matters set forth in this Section 2.5, including with respect to business such stockholder intends to bring before the annual meeting that involves a proposal or nomination that such stockholder requests to be included in the corporation’s proxy statement, the requirements of Rule 14a-8 (or any successor provision) under the 1934 Act. Nothing in this Section 2.5 shall be deemed to affect any right of the corporation to omit a proposal from the corporation’s proxy statement pursuant to Rule 14a-8 (or any successor provision) under the 1934 Act.

2.6 MANNER OF GIVING NOTICE; AFFIDAVIT OF NOTICE

Written notice of any meeting of stockholders shall be given either personally or by first-class mail or by telegraphic or other written communication. Notices not personally delivered shall be sent charges prepaid and shall be addressed to the stockholder at the address of that stockholder appearing on the books of the corporation or given by the stockholder to the corporation for the purpose of notice. Notice shall be deemed to have been given at the time when delivered personally or deposited in the mail or sent by telegram or other means of written communication. If any notice

addressed to a stockholder at the address of that stockholder appearing on the books of the corporation is returned to the corporation by the United States Postal Service marked to indicate that the United States Postal Service is unable to deliver the notice to the stockholder at that address, then all future notices or reports shall be deemed to have been duly given without further mailing if the same shall be available to the stockholder on written demand of the stockholder at the principal executive office of the corporation for a period of one (1) year from the date of the giving of the notice.

An affidavit of the mailing or other means of giving any notice of any stockholders' meeting, executed by the secretary, assistant secretary or any transfer agent of the corporation giving the notice, shall be prima facie evidence of the giving of such notice.

2.7 QUORUM

The holders of a majority in voting power of the stock issued and outstanding and entitled to vote thereat, present in person or represented by proxy at the meeting, shall constitute a quorum at all meetings of the stockholders for the transaction of business except as otherwise provided by statute or by the certificate of incorporation. If, however, such quorum is not present or represented at any meeting of the stockholders, then either (i) the chairman of the meeting or (ii) the holders of a majority of the shares represented at the meeting and entitled to vote thereat, present in person or represented by proxy, shall have power to adjourn the meeting in accordance with Section 2.8 of these bylaws.

When a quorum is present at any meeting, the vote of the holders of a majority of the stock having voting power present in person or represented by proxy shall decide any question brought before such meeting, unless the question is one upon which, by express provision of the laws of the State of Delaware or of the certificate of incorporation or these bylaws, a different vote is required, in which case such express provision shall govern and control the decision of the question.

If a quorum be initially present, the stockholders may continue to transact business until adjournment, notwithstanding the withdrawal of enough stockholders to leave less than a quorum, if any action taken is approved by a majority of the stockholders initially constituting the quorum.

2.8 ADJOURNED MEETING; NOTICE

Any stockholders' meeting, annual or special, whether or not a quorum is present, may be adjourned from time to time by (i) the chairman of the meeting or (ii) the stockholders by the vote of the holders of a majority of the shares represented at that meeting and entitled to vote thereat, either in person or by proxy. In the absence of a quorum, no other business may be transacted at that meeting except as provided in Section 2.7 of these bylaws.

When a meeting is adjourned to another time and place, unless these bylaws otherwise require, notice need not be given of the adjourned meeting if the time and place thereof are announced at the meeting at which the adjournment is taken. In no event shall the public announcement of an adjournment of a stockholders meeting commence a new time period for the

giving of a stockholder's notice as described in Section 2.5(b) or 2.5(c) herein. At the adjourned meeting the corporation may transact any business that might have been transacted at the original meeting. If the adjournment is for more than thirty (30) days, or if after the adjournment a new record date is fixed for the adjourned meeting, a notice of the adjourned meeting shall be given to each stockholder of record entitled to vote at the meeting.

2.9 VOTING

The stockholders entitled to vote at any meeting of stockholders shall be determined in accordance with the provisions of Section 2.12 of these bylaws, subject to the provisions of Sections 217 and 218 of the General Corporation Law of Delaware (relating to voting rights of fiduciaries, pledgors and joint owners, and to voting trusts and other voting agreements).

Except as may be otherwise provided in the certificate of incorporation or these bylaws, each stockholder shall be entitled to one vote for each share of capital stock held by such stockholder. Any stockholder entitled to vote on any matter may vote part of the shares in favor of the proposal and refrain from voting the remaining shares or, except when the matter is the election of directors, may vote them against the proposal; but, if the stockholder fails to specify the number of shares which the stockholder is voting affirmatively, it will be conclusively presumed that the stockholder's approving vote is with respect to all shares which the stockholder is entitled to vote.

2.10 VALIDATION OF MEETINGS; WAIVER OF NOTICE; CONSENT

The transactions of any meeting of stockholders, either annual or special, however called and noticed, and wherever held, shall be as valid as though they had been taken at a meeting duly held after regular call and notice, if a quorum be present either in person or by proxy, and if, either before or after the meeting, each person entitled to vote, who was not present in person or by proxy, signs a written waiver of notice or a consent to the holding of the meeting or an approval of the minutes thereof. The waiver of notice or consent or approval need not specify either the business to be transacted or the purpose of any annual or special meeting of stockholders. All such waivers, consents, and approvals shall be filed with the corporate records or made a part of the minutes of the meeting.

Attendance by a person at a meeting shall also constitute a waiver of notice of and presence at that meeting, except when the person objects at the beginning of the meeting to the transaction of any business because the meeting is not lawfully called or convened. Attendance at a meeting is not a waiver of any right to object to the consideration of matters required by law to be included in the notice of the meeting but not so included, if that objection is expressly made at the meeting.

2.11 STOCKHOLDER ACTION BY WRITTEN CONSENT WITHOUT A MEETING

Any action required or permitted to be taken at any annual or special meeting of stockholders may be taken without a meeting, without prior notice and without a vote, if a consent or consents in writing setting forth the action so taken shall be signed by the holders of outstanding stock having not less than the minimum number of votes that would be necessary to authorize or take such action

at a meeting at which all shares entitled to vote thereon were present and voted. Such consents shall be delivered to the corporation by delivery to its registered office in the state of Delaware, its principal place of business, or an officer or agent of the corporation having custody of the book in which proceedings of meetings of stockholders are recorded. Delivery made to a corporation's registered office shall be by hand or by certified or registered mail, return receipt requested.

2.12 RECORD DATE FOR STOCKHOLDER NOTICE; VOTING

For purposes of determining the stockholders entitled to notice of any meeting or to vote thereat or entitled to give consent to corporate action without a meeting, the board of directors may fix, in advance, a record date, which shall not precede the date upon which the resolution fixing the record date is adopted by the board of directors and which shall not be more than sixty (60) days nor less than ten (10) days before the date of any such meeting, and in such event only stockholders of record on the date so fixed are entitled to notice and to vote, notwithstanding any transfer of any shares on the books of the corporation after the record date.

If the board of directors does not so fix a record date:

(a) the record date for determining stockholders entitled to notice of or to vote at a meeting of stockholders shall be at the close of business on the business day next preceding the day on which notice is given, or, if notice is waived, at the close of business on the business day next preceding the day on which the meeting is held; and

(b) the record date for determining stockholders entitled to give consent to corporate action in writing without a meeting, (i) when no prior action by the board is required, shall be the day on which the first written consent is delivered to the corporation as provided in Section 2.3(b) of the General Corporation Law of Delaware, or (ii) when prior action by the board is required, shall be at the close of business on the day on which the board adopts the resolution relating to that action.

A determination of stockholders of record entitled to notice of or to vote at a meeting of stockholders shall apply to any adjournment of the meeting unless the board of directors fixes a new record date for the adjourned meeting, but the board of directors shall fix a new record date if the meeting is adjourned for more than thirty (30) days from the date set for the original meeting.

The record date for any other purpose shall be as provided in Section 8.1 of these bylaws.

2.13 PROXIES

Every person entitled to vote for directors, or on any other matter, shall have the right to do so either in person or by one or more agents authorized by a written proxy signed by the person and filed with the secretary of the corporation, but no such proxy shall be voted or acted upon after three (3) years from its date, unless the proxy provides for a longer period. A proxy shall be deemed signed if the stockholder's name is placed on the proxy (whether by manual signature, typewriting, telegraphic transmission, telefacsimile or otherwise) by the stockholder or the stockholder's

attorney-in-fact. The revocability of a proxy that states on its face that it is irrevocable shall be governed by the provisions of Section 212(e) of the General Corporation Law of Delaware.

2.14 ORGANIZATION

The president, or in the absence of the president, the chairman of the board, shall call the meeting of the stockholders to order, and shall act as chairman of the meeting. In the absence of the president, the chairman of the board, and all of the vice presidents, the stockholders shall appoint a chairman for such meeting. The chairman of any meeting of stockholders shall determine the order of business and the procedures at the meeting, including such matters as the regulation of the manner of voting and the conduct of business. The secretary of the corporation shall act as secretary of all meetings of the stockholders, but in the absence of the secretary at any meeting of the stockholders, the chairman of the meeting may appoint any person to act as secretary of the meeting.

2.15 LIST OF STOCKHOLDERS ENTITLED TO VOTE

The officer who has charge of the stock ledger of the corporation shall prepare and make, at least ten (10) days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting, arranged in alphabetical order, and showing the address of each stockholder and the number of shares registered in the name of each stockholder. Such list shall be open to the examination of any stockholder, for any purpose germane to the meeting, during ordinary business hours, for a period of at least ten (10) days prior to the meeting, either at a place within the city where the meeting is to be held, which place shall be specified in the notice of the meeting, or, if not so specified, at the place where the meeting is to be held. The list shall also be produced and kept at the time and place of the meeting during the whole time thereof, and may be inspected by any stockholder who is present.

2.16 INSPECTORS OF ELECTION

Before any meeting of stockholders, the board of directors may appoint an inspector or inspectors of election to act at the meeting or its adjournment. If no inspector of election is so appointed, then the chairman of the meeting may, and on the request of any stockholder or a stockholder's proxy shall, appoint an inspector or inspectors of election to act at the meeting. The number of inspectors shall be either one (1) or three (3). If inspectors are appointed at a meeting pursuant to the request of one (1) or more stockholders or proxies, then the holders of a majority of shares or their proxies present at the meeting shall determine whether one (1) or three (3) inspectors are to be appointed. If any person appointed as inspector fails to appear or fails or refuses to act, then the chairman of the meeting may, and upon the request of any stockholder or a stockholder's proxy shall, appoint a person to fill that vacancy.

Such inspectors shall:

(a) determine the number of shares outstanding and the voting power of each, the number of shares represented at the meeting, the existence of a quorum, and the authenticity, validity, and effect of proxies;

- (b) receive votes, ballots or consents;
- (c) hear and determine all challenges and questions in any way arising in connection with the right to vote;
- (d) count and tabulate all votes or consents;
- (e) determine when the polls shall close;
- (f) determine the result; and
- (g) do any other acts that may be proper to conduct the election or vote with fairness to all stockholders.

ARTICLE III

DIRECTORS

3.1 POWERS

Subject to the provisions of the General Corporation Law of Delaware and to any limitations in the certificate of incorporation or these bylaws relating to action required to be approved by the stockholders or by the outstanding shares, the business and affairs of the corporation shall be managed and shall be exercised by or under the direction of the board of directors. In addition to the powers and authorities these bylaws expressly confer upon them, the board of directors may exercise all such powers of the corporation and do all such lawful acts and things as are not by the General Corporation Law of Delaware or by the certificate of incorporation or by these bylaws required to be exercised or done by the stockholders.

3.2 NUMBER OF DIRECTORS

The board of directors shall consist of eight (8) members. The number of directors may be changed by an amendment to this bylaw, duly adopted by the board of directors or by the stockholders, or by a duly adopted amendment to the certificate of incorporation. No reduction of the authorized number of directors shall have the effect of removing any director before that director's term of office expires. If for any cause, the directors shall not have been elected at an annual meeting, they may be elected as soon thereafter as convenient at a special meeting of the stockholders called for that purpose in the manner provided in these Bylaws.

3.3 ELECTION AND TERM OF OFFICE OF DIRECTORS

Except as provided in Section 3.4 of these bylaws, directors shall be elected at each annual meeting of stockholders to hold office until the next annual meeting. Each director, including a director elected or appointed to fill a vacancy, shall hold office until the expiration of the term for

which elected and until such director's successor has been elected and qualified or until such director's earlier resignation or removal.

3.4 RESIGNATION AND VACANCIES

Any director may resign effective on giving written notice to the chairman of the board, the president, the secretary or the board of directors, unless the notice specifies a later time for that resignation to become effective. If the resignation of a director is effective at a future time, the board of directors may elect a successor to take office when the resignation becomes effective.

Vacancies in the board of directors may be filled by a majority of the remaining directors, even if less than a quorum, or by a sole remaining director; however, a vacancy created by the removal of a director by the vote of the stockholders or by court order may be filled only by the affirmative vote of a majority of the shares represented and voting at a duly held meeting at which a quorum is present (which shares voting affirmatively also constitute a majority of the required quorum). Each director so elected shall hold office until the next annual meeting of the stockholders and until a successor has been elected and qualified.

Unless otherwise provided in the certificate of incorporation or these bylaws:

(i) Vacancies and newly created directorships resulting from any increase in the authorized number of directors elected by all of the stockholders having the right to vote as a single class may be filled by a majority of the directors then in office, although less than a quorum, or by a sole remaining director.

(ii) Whenever the holders of any class or classes of stock or series thereof are entitled to elect one or more directors by the provisions of the certificate of incorporation, vacancies and newly created directorships of such class or classes or series may be filled by a majority of the directors elected by such class or classes or series thereof then in office, or by a sole remaining director so elected.

Any directors chosen pursuant to this Section 3.4 shall hold office for a term expiring at the next annual meeting of stockholders and until such director's successor shall have been duly elected and qualified.

If at any time, by reason of death or resignation or other cause, the corporation should have no directors in office, then any officer or any stockholder or an executor, administrator, trustee or guardian of a stockholder, or other fiduciary entrusted with like responsibility for the person or estate of a stockholder, may call a special meeting of stockholders in accordance with the provisions of the certificate of incorporation or these bylaws, or may apply to the Court of Chancery for a decree summarily ordering an election as provided in Section 211 of the General Corporation Law of Delaware.

If, at the time of filling any vacancy or any newly created directorship, the directors then in office constitute less than a majority of the whole board (as constituted immediately prior to any

such increase), then the Court of Chancery may, upon application of any stockholder or stockholders holding at least ten percent (10%) of the total number of the shares at the time outstanding having the right to vote for such directors, summarily order an election to be held to fill any such vacancies or newly created directorships, or to replace the directors chosen by the directors then in office as aforesaid, which election shall be governed by the provisions of Section 211 of the General Corporation Law of Delaware as far as applicable.

3.5 REMOVAL OF DIRECTORS

Unless otherwise restricted by statute, by the certificate of incorporation or by these bylaws, any director or the entire board of directors may be removed, with or without cause, by the holders of a majority of the shares then entitled to vote at an election of directors; provided, however, that, if and so long as stockholders of the corporation are entitled to cumulative voting, if less than the entire board is to be removed, no director may be removed without cause if the votes cast against his removal would be sufficient to elect him if then cumulatively voted at an election of the entire board of directors.

3.6 PLACE OF MEETINGS; MEETINGS BY TELEPHONE

Regular meetings of the board of directors may be held at any place within or outside the State of Delaware that has been designated from time to time by resolution of the board. In the absence of such a designation, regular meetings shall be held at the principal executive office of the corporation. Special meetings of the board may be held at any place within or outside the State of Delaware that has been designated in the notice of the meeting or, if not stated in the notice or if there is no notice, at the principal executive office of the corporation.

Any meeting of the board, regular or special, may be held by conference telephone or similar communication equipment, so long as all directors participating in the meeting can hear one another; and all such participating directors shall be deemed to be present in person at the meeting.

3.7 FIRST MEETINGS

The first meeting of each newly elected board of directors shall be held at such time and place as shall be fixed by the vote of the stockholders at the annual meeting. In the event of the failure of the stockholders to fix the time or place of such first meeting of the newly elected board of directors, or in the event such meeting is not held at the time and place so fixed by the stockholders, the meeting may be held at such time and place as shall be specified in a notice given as hereinafter provided for special meetings of the board of directors, or as shall be specified in a written waiver signed by all of the directors.

3.8 REGULAR MEETINGS

Regular meetings of the board of directors may be held without notice at such time as shall from time to time be determined by the board of directors. If any regular meeting day shall fall on a

legal holiday, then the meeting shall be held at the same time and place on the next succeeding full business day.

3.9 SPECIAL MEETINGS; NOTICE

Special meetings of the board of directors for any purpose or purposes may be called at any time by the chairman of the board of directors, the president, any vice president, the secretary or any two directors.

The person or persons authorized to call special meetings of the board of directors may fix the time and place of the meetings. Notice of the time and place of special meetings shall be delivered personally or by telephone to each director or sent by first-class mail, courier service or telegram, telecopy or other electronic or wireless means, charges prepaid, addressed to each director at that director's address as it is shown on the records of the corporation. If the notice is by mail, such notice shall be deposited in the United States mail at least four (4) days before the time of the holding of the meeting. If the notice is by courier service, telegram, overnight mail, telecopy or other electronic or wireless means, such notice shall be deemed adequately delivered when the notice is transmitted at least twenty-four (24) hours prior to the time set for such meeting. If the notice is by telephone or by hand delivery, such notice shall be deemed adequately delivered when the notice is given at least twenty-four (24) hours prior to the time set for such meeting. Any oral notice given personally or by telephone may be communicated either to the director or to a person at the office of the director who the person giving the notice has reason to believe will promptly communicate it to the director. The notice need not specify the purpose or the place of the meeting, if the meeting is to be held at the principal executive office of the corporation.

3.10 QUORUM

A majority of the authorized number of directors shall constitute a quorum for the transaction of business, except to adjourn as provided in Section 3.12 of these bylaws. Every act or decision done or made by a majority of the directors present at a duly held meeting at which a quorum is present shall be regarded as the act of the board of directors, subject to the provisions of the certificate of incorporation and applicable law.

A meeting at which a quorum is initially present may continue to transact business notwithstanding the withdrawal of directors, if any action taken is approved by at least a majority of the quorum for that meeting.

3.11 WAIVER OF NOTICE

Notice of a meeting need not be given to any director (i) who signs a waiver of notice, whether before or after the meeting, or (ii) who attends the meeting without protesting, prior thereto or at its commencement, the lack of notice to such directors. All such waivers shall be filed with the corporate records or made part of the minutes of the meeting. A waiver of notice need not specify the purpose of any regular or special meeting of the board of directors.

3.12 ADJOURNMENT

A majority of the directors present, whether or not constituting a quorum, may adjourn any meeting of the board to another time and place.

3.13 NOTICE OF ADJOURNMENT

Notice of the time and place of holding an adjourned meeting of the board need not be given unless the meeting is adjourned for more than twenty-four (24) hours. If the meeting is adjourned for more than twenty-four (24) hours, then notice of the time and place of the adjourned meeting shall be given before the adjourned meeting takes place, in the manner specified in Section 3.9 of these bylaws, to the directors who were not present at the time of the adjournment.

3.14 BOARD ACTION BY WRITTEN CONSENT WITHOUT A MEETING

Any action required or permitted to be taken by the board of directors may be taken without a meeting, provided that all members of the board individually or collectively consent in writing to that action. Such action by written consent shall have the same force and effect as a unanimous vote of the board of directors. Such written consent and any counterparts thereof shall be filed with the minutes of the proceedings of the board of directors.

3.15 FEES AND COMPENSATION OF DIRECTORS

Directors and members of committees may receive such compensation, if any, for their services and such reimbursement of expenses as may be fixed or determined by resolution of the board of directors. This Section 3.15 shall not be construed to preclude any director from serving the corporation in any other capacity as an officer, agent, employee or otherwise and receiving compensation for those services.

3.16 APPROVAL OF LOANS TO OFFICERS

The corporation may lend money to, or guarantee any obligation of, or otherwise assist any officer or other employee of the corporation or any of its subsidiaries, including any officer or employee who is a director of the corporation or any of its subsidiaries, whenever, in the judgment of the directors, such loan, guaranty or assistance may reasonably be expected to benefit the corporation. The loan, guaranty or other assistance may be with or without interest and may be unsecured, or secured in such manner as the board of directors shall approve, including, without limitation, a pledge of shares of stock of the corporation. Nothing contained in this section shall be deemed to deny, limit or restrict the powers of guaranty or warranty of the corporation at common law or under any statute.

3.17 SOLE DIRECTOR PROVIDED BY CERTIFICATE OF INCORPORATION

In the event only one director is required by these bylaws or the certificate of incorporation, then any reference herein to notices, waivers, consents, meetings or other actions by a majority or

quorum of the directors shall be deemed to refer to such notice, waiver, etc., by such sole director, who shall have all the rights and duties and shall be entitled to exercise all of the powers and shall assume all the responsibilities otherwise herein described as given to the board of directors.

ARTICLE IV

COMMITTEES

4.1 COMMITTEES OF DIRECTORS

The board of directors may, by resolution adopted by a majority of the authorized number of directors, designate one (1) or more committees, each consisting of two or more directors, to serve at the pleasure of the board. The board may designate one (1) or more directors as alternate members of any committee, who may replace any absent or disqualified member at any meeting of the committee. The appointment of members or alternate members of a committee requires the vote of a majority of the authorized number of directors. Any committee, to the extent provided in the resolution of the board, shall have and may exercise all the powers and authority of the board, but no such committee shall have the power or authority to (i) amend the certificate of incorporation (except that a committee may, to the extent authorized in the resolution or resolutions providing for the issuance of shares of stock adopted by the board of directors as provided in Section 151(a) of the General Corporation Law of Delaware, fix the designations and any of the preferences or rights of such shares relating to dividends, redemption, dissolution, any distribution of assets of the corporation or the conversion into, or the exchange of such shares for, shares of any other class or classes or any other series of the same or any other class or classes of stock of the corporation), (ii) adopt an agreement of merger or consolidation under Sections 251 or 252 of the General Corporation Law of Delaware, (iii) recommend to the stockholders the sale, lease or exchange of all or substantially all of the corporation's property and assets, (iv) recommend to the stockholders a dissolution of the corporation or a revocation of a dissolution or (v) amend the bylaws of the corporation; and, unless the board resolution establishing the committee, the bylaws or the certificate of incorporation expressly so provide, no such committee shall have the power or authority to declare a dividend, to authorize the issuance of stock, or to adopt a certificate of ownership and merger pursuant to Section 253 of the General Corporation Law of Delaware.

4.2 MEETINGS AND ACTION OF COMMITTEES

Meetings and actions of committees shall be governed by, and held and taken in accordance with, the following provisions of Article III of these bylaws: Section 3.6 (place of meetings; meetings by telephone), Section 3.8 (regular meetings), Section 3.9 (special meetings; notice), Section 3.10 (quorum), Section 3.11 (waiver of notice), Section 3.12 (adjournment), Section 3.13 (notice of adjournment) and Section 3.14 (board action by written consent without meeting), with such changes in the context of those bylaws as are necessary to substitute the committee and its members for the board of directors and its members; provided, however, that the time of regular meetings of committees may be determined either by resolution of the board of directors or by resolution of the committee, that special meetings of committees may also be called by resolution of

the board of directors, and that notice of special meetings of committees shall also be given to all alternate members, who shall have the right to attend all meetings of the committee. The board of directors may adopt rules for the government of any committee not inconsistent with the provisions of these bylaws.

4.3 COMMITTEE MINUTES

Each committee shall keep regular minutes of its meetings and report the same to the board of directors when required.

ARTICLE V

OFFICERS

5.1 OFFICERS

The Corporate Officers of the corporation shall be a president, a secretary and a chief financial officer. The corporation may also have, at the discretion of the board of directors, a chairman of the board, one or more vice presidents (however denominated), one or more assistant secretaries, one or more assistant treasurers and such other officers as may be appointed in accordance with the provisions of Section 5.3 of these bylaws. Any number of offices may be held by the same person.

In addition to the Corporate Officers of the Company described above, there may also be such Administrative Officers of the corporation as may be designated and appointed from time to time by the president of the corporation in accordance with the provisions of Section 5.12 of these bylaws.

5.2 ELECTION OF OFFICERS

The Corporate Officers of the corporation, except such officers as may be appointed in accordance with the provisions of Section 5.3 or Section 5.5 of these bylaws, shall be chosen by the board of directors, subject to the rights, if any, of an officer under any contract of employment, and shall hold their respective offices for such terms as the board of directors may from time to time determine.

5.3 SUBORDINATE OFFICERS

The board of directors may appoint, or may empower the president to appoint, such other Corporate Officers as the business of the corporation may require, each of whom shall hold office for such period, have such power and authority, and perform such duties as are provided in these bylaws or as the board of directors may from time to time determine.

The president may from time to time designate and appoint Administrative Officers of the corporation in accordance with the provisions of Section 5.12 of these bylaws.

5.4 REMOVAL AND RESIGNATION OF OFFICERS

Subject to the rights, if any, of a Corporate Officer under any contract of employment, any Corporate Officer may be removed, either with or without cause, by the board of directors at any regular or special meeting of the board or, except in case of a Corporate Officer chosen by the board of directors, by any Corporate Officer upon whom such power of removal may be conferred by the board of directors.

Any Corporate Officer may resign at any time by giving written notice to the corporation. Any resignation shall take effect at the date of the receipt of that notice or at any later time specified in that notice; and, unless otherwise specified in that notice, the acceptance of the resignation shall not be necessary to make it effective. Any resignation is without prejudice to the rights, if any, of the corporation under any contract to which the Corporate Officer is a party.

Any Administrative Officer designated and appointed by the president may be removed, either with or without cause, at any time by the president. Any Administrative Officer may resign at any time by giving written notice to the president or to the secretary of the corporation.

5.5 VACANCIES IN OFFICES

A vacancy in any office because of death, resignation, removal, disqualification or any other cause shall be filled in the manner prescribed in these bylaws for regular appointments to that office.

5.6 CHAIRMAN OF THE BOARD

The chairman of the board, if such an officer be elected, shall, if present, preside at meetings of the board of directors and exercise such other powers and perform such other duties as may from time to time be assigned to him by the board of directors or as may be prescribed by these bylaws. If there is no president, then the chairman of the board shall also be the chief executive officer of the corporation and shall have the powers and duties prescribed in Section 5.7 of these bylaws.

5.7 PRESIDENT

Subject to such supervisory powers, if any, as may be given by the board of directors to the chairman of the board, if there be such an officer, the president shall be the chief executive officer of the corporation and shall, subject to the control of the board of directors, have general supervision, direction and control of the business and the officers of the corporation. He or she shall preside at all meetings of the stockholders and, in the absence or nonexistence of a chairman of the board, at all meetings of the board of directors. He or she shall have the general powers and duties of management usually vested in the office of president of a corporation, and shall have such other powers and perform such other duties as may be prescribed by the board of directors or these bylaws.

5.8 VICE PRESIDENTS

In the absence or disability of the president, and if there is no chairman of the board, the vice presidents, if any, in order of their rank as fixed by the board of directors or, if not ranked, a vice president designated by the board of directors, shall perform all the duties of the president and when so acting shall have all the powers of, and be subject to all the restrictions upon, the president. The vice presidents shall have such other powers and perform such other duties as from time to time may be prescribed for them respectively by the board of directors, these bylaws, the president or the chairman of the board.

5.9 SECRETARY

The secretary shall keep or cause to be kept, at the principal executive office of the corporation or such other place as the board of directors may direct, a book of minutes of all meetings and actions of the board of directors, committees of directors and stockholders. The minutes shall show the time and place of each meeting, whether regular or special (and, if special, how authorized and the notice given), the names of those present at directors' meetings or committee meetings, the number of shares present or represented at stockholders' meetings and the proceedings thereof.

The secretary shall keep, or cause to be kept, at the principal executive office of the corporation or at the office of the corporation's transfer agent or registrar, as determined by resolution of the board of directors, a share register or a duplicate share register, showing the names of all stockholders and their addresses, the number and classes of shares held by each, the number and date of certificates evidencing such shares and the number and date of cancellation of every certificate surrendered for cancellation.

The secretary shall give, or cause to be given, notice of all meetings of the stockholders and of the board of directors required to be given by law or by these bylaws. He or she shall keep the seal of the corporation, if one be adopted, in safe custody and shall have such other powers and perform such other duties as may be prescribed by the board of directors or by these bylaws.

5.10 CHIEF FINANCIAL OFFICER

The chief financial officer shall keep and maintain, or cause to be kept and maintained, adequate and correct books and records of accounts of the properties and business transactions of the corporation, including accounts of its assets, liabilities, receipts, disbursements, gains, losses, capital, retained earnings and shares. The books of account shall at all reasonable times be open to inspection by any director for a purpose reasonably related to his position as a director.

The chief financial officer shall deposit all money and other valuables in the name and to the credit of the corporation with such depositaries as may be designated by the board of directors. He or she shall disburse the funds of the corporation as may be ordered by the board of directors, shall render to the president and directors, whenever they request it, an account of all of his or her transactions as chief financial officer and of the financial condition of the corporation, and shall have

such other powers and perform such other duties as may be prescribed by the board of directors or these bylaws.

5.11 ASSISTANT SECRETARY

The assistant secretary, if any, or, if there is more than one, the assistant secretaries in the order determined by the board of directors (or if there be no such determination, then in the order of their election) shall, in the absence of the secretary or in the event of his or her inability or refusal to act, perform the duties and exercise the powers of the secretary and shall perform such other duties and have such other powers as the board of directors may from time to time prescribe.

5.12 ADMINISTRATIVE OFFICERS

In addition to the Corporate Officers of the corporation as provided in Section 5.1 of these bylaws and such subordinate Corporate Officers as may be appointed in accordance with Section 5.3 of these bylaws, there may also be such Administrative Officers of the corporation as may be designated and appointed from time to time by the president of the corporation. Administrative Officers shall perform such duties and have such powers as from time to time may be determined by the president or the board of directors in order to assist the Corporate Officers in the furtherance of their duties. In the performance of such duties and the exercise of such powers, however, such Administrative Officers shall have limited authority to act on behalf of the corporation as the board of directors shall establish, including but not limited to limitations on the dollar amount and on the scope of agreements or commitments that may be made by such Administrative Officers on behalf of the corporation, which limitations may not be exceeded by such individuals or altered by the president without further approval by the board of directors.

5.13 AUTHORITY AND DUTIES OF OFFICERS

In addition to the foregoing powers, authority and duties, all officers of the corporation shall respectively have such authority and powers and perform such duties in the management of the business of the corporation as may be designated from time to time by the board of directors.

ARTICLE VI

INDEMNIFICATION OF DIRECTORS, OFFICERS, EMPLOYEES AND OTHER AGENTS

6.1 INDEMNIFICATION OF DIRECTORS AND OFFICERS

The corporation shall, to the maximum extent and in the manner permitted by the General Corporation Law of Delaware as the same now exists or may hereafter be amended, indemnify any person against expenses (including attorneys' fees), judgments, fines, and amounts paid in settlement actually and reasonably incurred in connection with any threatened, pending or completed action, suit, or proceeding in which such person was or is a party or is threatened to be made a party by reason of the fact that such person is or was a director or officer of the corporation. For purposes of this Section 6.1, a "director" or "officer" of the corporation shall mean any person (i) who is or was

a director or officer of the corporation, (ii) who is or was serving at the request of the corporation as a director or officer of another corporation, partnership, joint venture, trust or other enterprise or (iii) who was a director or officer of a corporation which was a predecessor corporation of the corporation or of another enterprise at the request of such predecessor corporation.

The corporation shall be required to indemnify a director or officer in connection with an action, suit, or proceeding (or part thereof) initiated by such director or officer only if the initiation of such action, suit, or proceeding (or part thereof) by the director or officer was authorized by the board of Directors of the corporation.

The corporation shall pay the expenses (including attorney's fees) incurred by a director or officer of the corporation entitled to indemnification hereunder in defending any action, suit or proceeding referred to in this Section 6.1 in advance of its final disposition; provided, however, that payment of expenses incurred by a director or officer of the corporation in advance of the final disposition of such action, suit or proceeding shall be made only upon receipt of an undertaking by the director or officer to repay all amounts advanced if it should ultimately be determined that the director or officer is not entitled to be indemnified under this Section 6.1 or otherwise.

The rights conferred on any person by this Article shall not be exclusive of any other rights which such person may have or hereafter acquire under any statute, provision of the corporation's certificate of incorporation, these bylaws, agreement, vote of the stockholders or disinterested directors or otherwise.

Any repeal or modification of the foregoing provisions of this Article shall not adversely affect any right or protection hereunder of any person in respect of any act or omission occurring prior to the time of such repeal or modification.

6.2 INDEMNIFICATION OF OTHERS

The corporation shall have the power, to the maximum extent and in the manner permitted by the General Corporation Law of Delaware as the same now exists or may hereafter be amended, to indemnify any person (other than directors and officers) against expenses (including attorneys' fees), judgments, fines, and amounts paid in settlement actually and reasonably incurred in connection with any threatened, pending or completed action, suit, or proceeding, in which such person was or is a party or is threatened to be made a party by reason of the fact that such person is or was an employee or agent of the corporation. For purposes of this Section 6.2, an "employee" or "agent" of the corporation (other than a director or officer) shall mean any person (i) who is or was an employee or agent of the corporation, (ii) who is or was serving at the request of the corporation as an employee or agent of another corporation, partnership, joint venture, trust or other enterprise or (iii) who was an employee or agent of a corporation which was a predecessor corporation of the corporation or of another enterprise at the request of such predecessor corporation.

6.3 INSURANCE

The corporation may purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against any liability asserted against him or her and incurred by him or her in any such capacity, or arising out of his or her status as such, whether or not the corporation would have the power to indemnify him or her against such liability under the provisions of the General Corporation Law of Delaware.

ARTICLE VII

RECORDS AND REPORTS

7.1 MAINTENANCE AND INSPECTION OF RECORDS

The corporation shall, either at its principal executive office or at such place or places as designated by the board of directors, keep a record of its stockholders listing their names and addresses and the number and class of shares held by each stockholder, a copy of these bylaws as amended to date, accounting books and other records of its business and properties.

Any stockholder of record, in person or by attorney or other agent, shall, upon written demand under oath stating the purpose thereof, have the right during the usual hours for business to inspect for any proper purpose the corporation's stock ledger, a list of its stockholders, and its other books and records and to make copies or extracts therefrom. A proper purpose shall mean a purpose reasonably related to such person's interest as a stockholder. In every instance where an attorney or other agent is the person who seeks the right to inspection, the demand under oath shall be accompanied by a power of attorney or such other writing that authorizes the attorney or other agent to so act on behalf of the stockholder. The demand under oath shall be directed to the corporation at its registered office in Delaware or at its principal place of business.

7.2 INSPECTION BY DIRECTORS

Any director shall have the right to examine the corporation's stock ledger, a list of its stockholders and its other books and records for a purpose reasonably related to his or her position as a director.

7.3 ANNUAL STATEMENT TO STOCKHOLDERS

The board of directors shall present at each annual meeting, and at any special meeting of the stockholders when called for by vote of the stockholders, a full and clear statement of the business and condition of the corporation.

7.4 REPRESENTATION OF SHARES OF OTHER CORPORATIONS

The chairman of the board, if any, the president, any vice president, the chief financial officer, the secretary or any assistant secretary of this corporation, or any other person authorized by the board of directors or the president or a vice president, is authorized to vote, represent and exercise on behalf of this corporation all rights incident to any and all shares of the stock of any other corporation or corporations standing in the name of this corporation. The authority herein granted may be exercised either by such person directly or by any other person authorized to do so by proxy or power of attorney duly executed by such person having the authority.

7.5 CERTIFICATION AND INSPECTION OF BYLAWS

The original or a copy of these bylaws, as amended or otherwise altered to date, certified by the secretary, shall be kept at the corporation's principal executive office and shall be open to inspection by the stockholders of the corporation, at all reasonable times during office hours.

ARTICLE VIII

GENERAL MATTERS

8.1 RECORD DATE FOR PURPOSES OTHER THAN NOTICE AND VOTING

For purposes of determining the stockholders entitled to receive payment of any dividend or other distribution or allotment of any rights or the stockholders entitled to exercise any rights in respect of any change, conversion or exchange of stock, or for the purpose of any other lawful action, the board of directors may fix, in advance, a record date, which shall not precede the date upon which the resolution fixing the record date is adopted and which shall not be more than sixty (60) days before any such action. In that case, only stockholders of record at the close of business on the date so fixed are entitled to receive the dividend, distribution or allotment of rights, or to exercise such rights, as the case may be, notwithstanding any transfer of any shares on the books of the corporation after the record date so fixed, except as otherwise provided by law.

If the board of directors does not so fix a record date, then the record date for determining stockholders for any such purpose shall be at the close of business on the day on which the board of directors adopts the applicable resolution.

8.2 CHECKS; DRAFTS; EVIDENCES OF INDEBTEDNESS

From time to time, the board of directors shall determine by resolution which person or persons may sign or endorse all checks, drafts, other orders for payment of money, notes or other evidences of indebtedness that are issued in the name of or payable to the corporation, and only the persons so authorized shall sign or endorse those instruments.

8.3 CORPORATE CONTRACTS AND INSTRUMENTS: HOW EXECUTED

The board of directors, except as otherwise provided in these bylaws, may authorize and empower any officer or officers, or agent or agents, to enter into any contract or execute any instrument in the name of and on behalf of the corporation; such power and authority may be general or confined to specific instances. Unless so authorized or ratified by the board of directors or within the agency power of an officer, no officer, agent or employee shall have any power or authority to bind the corporation by any contract or engagement or to pledge its credit or to render it liable for any purpose or for any amount.

8.4 STOCK CERTIFICATES; TRANSFER; PARTLY PAID SHARES

The shares of the corporation shall be represented by certificates, provided that the board of directors of the corporation may provide by resolution or resolutions that some or all of any or all classes or series of its stock shall be uncertificated shares. Any such resolution shall not apply to shares represented by a certificate until such certificate is surrendered to the corporation. Notwithstanding the adoption of such a resolution by the board of directors, every holder of stock represented by certificates and, upon request, every holder of uncertificated shares, shall be entitled to have a certificate signed by, or in the name of the corporation by, the chairman or vice-chairman of the board of directors, or the president or vice-president, and by the treasurer or an assistant treasurer, or the secretary or an assistant secretary of such corporation representing the number of shares registered in certificate form. Any or all of the signatures on the certificate may be a facsimile. In case any officer, transfer agent or registrar who has signed or whose facsimile signature has been placed upon a certificate has ceased to be such officer, transfer agent or registrar before such certificate is issued, it may be issued by the corporation with the same effect as if he or she were such officer, transfer agent or registrar at the date of issue.

Certificates for shares shall be of such form and device as the board of directors may designate and shall state the name of the record holder of the shares represented thereby; its number; date of issuance; the number of shares for which it is issued; a summary statement or reference to the powers, designations, preferences or other special rights of such stock and the qualifications, limitations or restrictions of such preferences and/or rights, if any; a statement or summary of liens, if any; a conspicuous notice of restrictions upon transfer or registration of transfer, if any; a statement as to any applicable voting trust agreement; if the shares be assessable, or, if assessments are collectible by personal action, a plain statement of such facts.

Upon surrender to the secretary or transfer agent of the corporation of a certificate for shares duly endorsed or accompanied by proper evidence of succession, assignment or authority to transfer, it shall be the duty of the corporation to issue a new certificate to the person entitled thereto, cancel the old certificate and record the transaction upon its books.

The corporation may issue the whole or any part of its shares as partly paid and subject to call for the remainder of the consideration to be paid therefor. Upon the face or back of each stock certificate issued to represent any such partly paid shares, or upon the books and records of the corporation in the case of uncertificated partly paid shares, the total amount of the consideration to

be paid therefor and the amount paid thereon shall be stated. Upon the declaration of any dividend on fully paid shares, the corporation shall declare a dividend upon partly paid shares of the same class, but only upon the basis of the percentage of the consideration actually paid thereon.

8.5 SPECIAL DESIGNATION ON CERTIFICATES

If the corporation is authorized to issue more than one class of stock or more than one series of any class, then the powers, the designations, the preferences and the relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights shall be set forth in full or summarized on the face or back of the certificate that the corporation shall issue to represent such class or series of stock; provided, however, that, except as otherwise provided in Section 202 of the General Corporation Law of Delaware, in lieu of the foregoing requirements there may be set forth on the face or back of the certificate that the corporation shall issue to represent such class or series of stock a statement that the corporation will furnish without charge to each stockholder who so requests the powers, the designations, the preferences and the relative, participating, optional or other special rights of each class of stock or series thereof and the qualifications, limitations or restrictions of such preferences and/or rights.

8.6 LOST CERTIFICATES

Except as provided in this Section 8.6, no new certificates for shares shall be issued to replace a previously issued certificate unless the latter is surrendered to the corporation and cancelled at the same time. The board of directors may, in case any share certificate or certificate for any other security is lost, stolen or destroyed, authorize the issuance of replacement certificates on such terms and conditions as the board may require; the board may require indemnification of the corporation secured by a bond or other adequate security sufficient to protect the corporation against any claim that may be made against it, including any expense or liability, on account of the alleged loss, theft or destruction of the certificate or the issuance of the replacement certificate.

8.7 TRANSFER AGENTS AND REGISTRARS

The board of directors may appoint one or more transfer agents or transfer clerks, and one or more registrars, each of which shall be an incorporated bank or trust company — either domestic or foreign, who shall be appointed at such times and places as the requirements of the corporation may necessitate and the board of directors may designate.

8.8 CONSTRUCTION; DEFINITIONS

Unless the context requires otherwise, the general provisions, rules of construction and definitions in the General Corporation Law of Delaware shall govern the construction of these bylaws. Without limiting the generality of this provision, as used in these bylaws, the singular number includes the plural, the plural number includes the singular, and the term “person” includes both an entity and a natural person.

ARTICLE IX

AMENDMENTS

The original or other bylaws of the corporation may be adopted, amended or repealed by the stockholders entitled to vote; provided, however, that the corporation may, in its certificate of incorporation, confer the power to adopt, amend or repeal bylaws upon the directors. The fact that such power has been so conferred upon the directors shall not divest the stockholders of the power, nor limit their power to adopt, amend or repeal bylaws.

Whenever an amendment or new bylaw is adopted, it shall be copied in the book of bylaws with the original bylaws, in the appropriate place. If any bylaw is repealed, the fact of repeal with the date of the meeting at which the repeal was enacted or the filing of the operative written consent(s) shall be stated in said book.

ARTICLE X

DISSOLUTION

If it should be deemed advisable in the judgment of the board of directors of the corporation that the corporation should be dissolved, the board, after the adoption of a resolution to that effect by a majority of the whole board at any meeting called for that purpose, shall cause notice to be mailed to each stockholder entitled to vote thereon of the adoption of the resolution and of a meeting of stockholders to take action upon the resolution.

At the meeting a vote shall be taken for and against the proposed dissolution. If a majority of the outstanding stock of the corporation entitled to vote thereon votes for the proposed dissolution, then a certificate stating that the dissolution has been authorized in accordance with the provisions of Section 275 of the General Corporation Law of Delaware and setting forth the names and residences of the directors and officers shall be executed, acknowledged, and filed and shall become effective in accordance with Section 103 of the General Corporation Law of Delaware. Upon such certificate's becoming effective in accordance with Section 103 of the General Corporation Law of Delaware, the corporation shall be dissolved.

Whenever all the stockholders entitled to vote on a dissolution consent in writing, either in person or by duly authorized attorney, to a dissolution, no meeting of directors or stockholders shall be necessary. The consent shall be filed and shall become effective in accordance with Section 103 of the General Corporation Law of Delaware. Upon such consent's becoming effective in accordance with Section 103 of the General Corporation Law of Delaware, the corporation shall be dissolved. If the consent is signed by an attorney, then the original power of attorney or a photocopy thereof shall be attached to and filed with the consent. The consent filed with the Secretary of State shall have attached to it the affidavit of the secretary or some other officer of the corporation stating that the consent has been signed by or on behalf of all the stockholders entitled to vote on a dissolution; in addition, there shall be attached to the consent a certification by the secretary or some

other officer of the corporation setting forth the names and residences of the directors and officers of the corporation.

ARTICLE XI

CUSTODIAN

11.1 APPOINTMENT OF A CUSTODIAN IN CERTAIN CASES

The Court of Chancery, upon application of any stockholder, may appoint one or more persons to be custodians and, if the corporation is insolvent, to be receivers, of and for the corporation when:

(i) at any meeting held for the election of directors the stockholders are so divided that they have failed to elect successors to directors whose terms have expired or would have expired upon qualification of their successors; or

(ii) the business of the corporation is suffering or is threatened with irreparable injury because the directors are so divided respecting the management of the affairs of the corporation that the required vote for action by the board of directors cannot be obtained and the stockholders are unable to terminate this division; or

(iii) the corporation has abandoned its business and has failed within a reasonable time to take steps to dissolve, liquidate or distribute its assets.

11.2 DUTIES OF CUSTODIAN

The custodian shall have all the powers and title of a receiver appointed under Section 291 of the General Corporation Law of Delaware, but the authority of the custodian shall be to continue the business of the corporation and not to liquidate its affairs and distribute its assets, except when the Court of Chancery otherwise orders and except in cases arising under Sections 226(a)(3) or 352(a)(2) of the General Corporation Law of Delaware.

HARMONIC INC.

CERTIFICATE OF AMENDMENT OF BYLAWS

The undersigned hereby certifies that he or she is the duly elected, qualified, and acting Secretary or Assistant Secretary of Harmonic Inc., a Delaware corporation, and that the foregoing bylaws were amended and restated on February 6, 2018 by the corporation's board of directors.

IN WITNESS WHEREOF, the undersigned has hereunto set his or her hand this 6th day of February, 2018.

/s/ Timothy C. Chu

Secretary

HARMONIC INC.
1995 STOCK PLAN
AS AMENDED AND RESTATED
July 11, 2017
RESTRICTED STOCK UNIT AGREEMENT

Unless otherwise defined herein, the terms defined in the Harmonic Inc. 1995 Stock Plan, As Amended and Restated (the “Plan”) will have the same defined meanings in this Restricted Stock Unit Agreement (the “Agreement”).

1. Grant. The Company hereby grants to Participant under the Plan an Award of Restricted Stock (denominated in units) (the “Restricted Stock Units”), subject to all of the terms and conditions in this Agreement, the related RSU Notice of Grant and the Plan, all of which are incorporated herein by reference. Subject to Section 19(c) of the Plan, in the event of a conflict between the terms and conditions of the Plan and the terms and conditions of this Agreement, the terms and conditions of the Plan will prevail.

2. Company’s Obligation to Pay. Unless and until the Restricted Stock Units will have vested in the manner set forth in the related RSU Notice of Grant, paragraph 3 below or Section 17 of the Plan, Participant will have no right to payment of any Shares. Prior to actual payment of any vested Shares, such Restricted Stock Units will represent an unsecured obligation of the Company, payable (if at all) only from the general assets of the Company.

3. Vesting Schedule and Issuance of Shares.

(a) Subject to paragraphs 4 and 12, and Section 17 of the Plan, the Restricted Stock Units awarded by this Agreement will vest as to the number of units, and on the dates shown, as set forth in the related RSU Notice of Grant (each a “Vesting Date”), but only if Participant will have been in Continuous Status as an Employee or Consultant from the date the Restricted Stock Units were granted until the date such vesting occurs. If Participant is not in Continuous Status as an Employee or Consultant on such date(s), the Award shall terminate, as set forth in paragraph 4.

(b) As soon as practical upon or following each Vesting Date (but, except as provided in this Agreement, in no event later than the later of (i) the end of the calendar year that includes the applicable Vesting Date and (ii) two and one-half (2½) months following the

applicable Vesting Date, subject to any six (6) month delay required by paragraph 8), one Share shall be issued for each Restricted Stock Unit that vests on such Vesting Date, subject to the terms and provisions of the Plan and this Agreement.

(c) (i) If the Administrator, in its discretion, accelerates the vesting of the balance, or some lesser portion of the balance, of the Award, the payment of such accelerated portion of the Award shall be made as soon as practicable after the new vesting date, but, except as provided in this Agreement, in no event later than two and one-half (2½) months following the end of the Company's taxable year in which the applicable Vesting Date occurs; provided, however, if the Award is "deferred compensation" within the meaning of Section 409A, the payment of such accelerated portion of the Award nevertheless shall be made at the same time or times as if such Award had vested in accordance with the vesting schedule set forth in paragraph 3(a), including any necessary application of paragraph 8 (whether or not Participant continues to provide services to the Company or a Parent or Subsidiary of the Company as of such date(s)), unless an earlier payment date, in the judgment of the Administrator, would not cause Participant to incur an additional tax under Section 409A, in which case, payment of such accelerated Award shall be made within two and one-half (2½) months following the earliest permissible payment date that would not cause Participant to incur an additional tax under Section 409A, subject to paragraph 8 with respect to specified employees. Notwithstanding the foregoing, any delay in payment pursuant to this paragraph 3(c) will cease upon Participant's death and such payment will be made as soon as practicable after the date of Participant's death. For purposes of this Agreement, "Section 409A" means Section 409A of the Internal Revenue Code of 1986, as amended, and any proposed, temporary or final Treasury Regulations and Internal Revenue Service guidance thereunder, as each may be amended from time to time.

(ii) If the vesting of all or a portion of this Award accelerates pursuant to (a) Section 17(c) of the Plan in the event of a merger or asset sale that is not a "change in control" within the meaning of Section 409A, or (b) pursuant to any other plan or agreement that provides for acceleration in the event of a merger or asset sale that is not a "change in control" within the meaning of Section 409A, then the payment of such accelerated portion of the Award (including any new or additional Awards existing as a result of paragraph 11 of this Agreement) will be made in accordance with the timing of payment rules that apply to discretionary accelerations under paragraph 3(c)(i). If the vesting of all or a portion of this Award accelerates in the event of a merger or asset sale that is a "change in control" within the meaning of Section 409A, then the payment of such accelerated portion of the Award (including any new or additional Awards existing as a result of paragraph 11 of this Agreement) will be made within two and one-half (2½) months of the merger or asset sale.

(d) No fractional Shares shall be issued under this Agreement.

4. Forfeiture upon Termination of Continuous Status as an Employee or Consultant. Except as provided in paragraph 3, if Participant's Continuous Status as an Employee or Consultant terminates for any or no reason prior to vesting, the unvested Restricted Stock Units awarded by this Agreement will thereupon be forfeited and automatically transferred to and reacquired by the Company at no cost to the Company and Participant's right to acquire any Shares hereunder will immediately terminate.

5. Payments after Death. Any distribution or delivery to be made to Participant under this Agreement will, if Participant is then deceased, be made to Participant's designated beneficiary, or if no beneficiary survives Participant, the administrator or executor of Participant's estate. Any such transferee must furnish the Company with (a) written notice of his or her status as a transferee, and (b) evidence satisfactory to the Company to establish the validity of the transfer and compliance with any laws or regulations pertaining to said transfer.

6. Withholding of Taxes.

(a) Participant acknowledges that, regardless of any action taken by the Company or, if different, Participant's employer (the "Employer"), the ultimate liability for all income tax, social insurance, payroll tax, fringe benefits tax, payment on account or other tax-related items related to Participant's participation in the Plan and legally applicable to Participant or deemed by the Company or the Employer in its discretion to be an appropriate charge to Participant even if legally applicable to the Company or the Employer ("Tax-Related Items"), is and remains Participant's responsibility and may exceed the amount actually withheld by the Company or the Employer. Participant further acknowledges that the Company and/or the Employer (i) make no representations or undertakings regarding the treatment of any Tax-Related Items in connection with any aspect of the Award, including, but not limited to, the grant, vesting or settlement of the Restricted Stock Units, the subsequent sale of Shares acquired pursuant to such settlement and the receipt of any dividends and/or any dividend equivalents; and (ii) do not commit to and are under no obligation to structure the terms of the Award or any aspect of the Award to reduce or eliminate Participant's liability for Tax-Related Items or achieve any particular tax result. Further, if Participant is subject to Tax-Related Items in more than one jurisdiction, Participant acknowledges that the Company and/or the Employer (or former employer, as applicable) may be required to withhold or account for Tax-Related Items in more than one jurisdiction.

(b) Prior to the relevant taxable or tax withholding event, as applicable, Participant agrees to make adequate arrangements satisfactory to the Company and/or the Employer to satisfy all Tax-Related Items. In this regard, Participant authorizes the Company or its respective agents to satisfy the obligations with regard to all Tax-Related Items by withholding in Shares to be issued upon settlement of the Restricted Stock Units. By

Participant's acceptance of the Award, Participant authorizes and directs, if by the Company in its sole discretion, the Company and any brokerage firm determined acceptable to the Company to sell on Participant's behalf a whole number of Shares from those Shares issuable to Participant as the Company determines to be appropriate to generate cash proceeds sufficient to satisfy the obligation for Tax-Related Items.

(c) Depending on the withholding method, the Company or the Employer may withhold or account for Tax-Related Items by considering applicable minimum statutory withholding amounts or other applicable withholding rates, including maximum applicable rates, in which case Participant will receive a refund of any over-withheld amount in cash and will have no entitlement to the Share equivalent. If the obligation for Tax-Related Items is satisfied by withholding in Shares, for tax purposes, Participant is deemed to have been issued the full number of Shares subject to the vested Restricted Stock Units, notwithstanding that a number of the Shares are held back solely for the purpose of paying the Tax-Related Items.

(d) Finally, Participant agrees to pay to the Company or the Employer, including through withholding from Participant's wages or other cash compensation paid to Participant by the Company and/or the Employer, any amount of Tax-Related Items that the Company or the Employer may be required to withhold or account for as a result of Participant's participation in the Plan that cannot be satisfied by the means previously described. If Participant fails to make satisfactory arrangements for the payment of any required Tax-Related Items hereunder at the time any applicable Restricted Stock Units otherwise are scheduled to vest pursuant to paragraph 3, Participant will permanently forfeit such Restricted Stock Units and any right to receive Shares thereunder and the Restricted Stock Units will be returned to the Company at no cost to the Company.

7. Rights as Stockholder. Neither Participant nor any person claiming under or through Participant will have any of the rights or privileges of a stockholder of the Company in respect of any Shares deliverable hereunder unless and until certificates representing such Shares will have been issued, recorded on the records of the Company or its transfer agents or registrars, and delivered to Participant. After such issuance, recordation and delivery, Participant will have all the rights of a stockholder of the Company with respect to voting such Shares and receipt of dividends and distributions on such Shares.

8. Code Section 409A. Notwithstanding anything in the Plan or this Agreement to the contrary, if the vesting of the balance, or some lesser portion of the balance, of the Restricted Stock Units are accelerated in connection with Participant's termination of Continuous Status as an Employee or Consultant, such accelerated Restricted Stock Units will not be payable until and unless Participant has a "separation from service" within the meaning of Section 409A. Further, and notwithstanding anything in the Plan or this Agreement to the contrary, if any such

accelerated Restricted Stock Units would otherwise become payable upon a “separation from service” within the meaning of Section 409A, and if (a) Participant is a “specified employee” within the meaning of Section 409A at the time of such “separation from service” within the meaning of Section 409A (other than due to Participant’s death) and (b) the payment of all or a portion of such accelerated Restricted Stock Units would result in the imposition of additional tax under Section 409A if paid to Participant on or within the six (6) month period following Participant’s “separation from service” within the meaning of Section 409A, then the payment of the portion of such accelerated Restricted Stock Units that would result in the additional tax imposition will not be made until the date six (6) months and one (1) day following the date of Participant’s “separation from service” within the meaning of Section 409A, unless Participant dies following his or her termination of Continuous Status as an Employee or Consultant, in which case the Restricted Stock Units will be paid in Shares to Participant’s estate as soon as practicable following his or her death (and in all cases within ninety (90) days of Participant’s death). It is the intent of this Agreement to comply with the requirements of Section 409A so that none of the Restricted Stock Units provided under this Agreement or Shares issuable thereunder will be subject to the additional tax imposed under Section 409A, and any ambiguities herein will be interpreted to so comply.

9. No Guarantee of Continued Service. PARTICIPANT ACKNOWLEDGES AND AGREES THAT THE VESTING OF THE RESTRICTED STOCK UNITS PURSUANT TO THE VESTING SCHEDULE HEREOF IS EARNED ONLY BY REMAINING IN CONTINUOUS STATUS AS AN EMPLOYEE OR CONSULTANT AT THE WILL OF THE EMPLOYER AND NOT THROUGH THE ACT OF BEING HIRED, BEING GRANTED THIS AWARD OF RESTRICTED STOCK UNITS OR ACQUIRING SHARES HEREUNDER. PARTICIPANT FURTHER ACKNOWLEDGES AND AGREES THAT THIS AGREEMENT, THE TRANSACTIONS CONTEMPLATED HEREUNDER AND THE VESTING SCHEDULE SET FORTH HEREIN DO NOT CONSTITUTE AN EXPRESS OR IMPLIED PROMISE OF CONTINUED SERVICE WITH THE EMPLOYER FOR THE VESTING PERIOD, FOR ANY PERIOD, OR AT ALL, AND WILL NOT INTERFERE IN ANY WAY WITH PARTICIPANT’S RIGHT OR THE RIGHT OF THE EMPLOYER TO TERMINATE PARTICIPANT’S RELATIONSHIP WITH THE EMPLOYER AT ANY TIME, WITH OR WITHOUT CAUSE.

10. Address for Notices. Any notice to be given to the Company under the terms of this Agreement will be addressed to the Company, in care of its Vice President, Human Resources at Harmonic Inc., 549 Baltic Way, Sunnyvale, California, 94089, or at such other address as the Company may hereafter designate in writing.

11. Changes in Restricted Stock Units. In the event that as a result of a stock or extraordinary cash dividend, stock split, distribution, reclassification, recapitalization, combination of Shares or the adjustment in capital stock of the Company or otherwise, or as a result of a merger, consolidation, spin-off or other corporate transaction or event, the Restricted Stock Units will be increased, reduced or otherwise affected, and by virtue of any such event Participant will in his or her capacity as owner of unvested Restricted Stock Units which have been awarded to him or her (the "Prior Restricted Stock Units") be entitled to new or additional or different shares of stock, cash or other securities or property (other than rights or warrants to purchase securities), such new or additional or different shares, cash or securities or property will thereupon be considered to be unvested Restricted Stock Units and will be subject to all of the conditions and restrictions that were applicable to the Prior Restricted Stock Units pursuant to this Agreement and the Plan. If Participant receives rights or warrants with respect to any Prior Restricted Stock Units, such rights or warrants may be held or exercised by Participant, provided that until such exercise any such rights or warrants and after such exercise any shares or other securities acquired by the exercise of such rights or warrants will be considered to be unvested Restricted Stock Units and will be subject to all of the conditions and restrictions which were applicable to the Prior Restricted Stock Units pursuant to the Plan and this Agreement. The Administrator in its absolute discretion at any time may accelerate the vesting of all or any portion of such new or additional shares of stock, cash or securities, rights or warrants to purchase securities or shares or other securities acquired by the exercise of such rights or warrants; provided, however, that the payment of such accelerated new or additional awards shall be made in accordance with the timing of payment rules under paragraph 3(c)(i).

12. Nature of Award. In accepting the Award, Participant acknowledges, understands and agrees that:

(a) the Plan is established voluntarily by the Company and it is discretionary in nature;

(b) the grant of the Award is exceptional, voluntary and occasional and does not create any contractual or other right to receive future Awards of Restricted Stock Units, or benefits in lieu of Awards, even if Restricted Stock Units have been granted in the past;

(c) all decisions with respect to future Awards, if any, will be at the sole discretion of the Company;

(d) Participant is voluntarily participating in the Plan; the Restricted Stock Units and any Shares acquired under the Plan, and the income and value of same, are not intended to replace any pension rights or compensation;

(e) the Restricted Stock Units and the Shares subject to the Award, and the income and value of same, are not part of normal or expected compensation for purposes of calculating any severance, resignation, termination, redundancy, dismissal, end-of-service payments, bonuses, long-service awards, pension or retirement or welfare benefits or similar payments;

(f) unless otherwise agreed with the Company, the Restricted Stock Units and the Shares subject to the Award, and the income and value of the same, are not offered as consideration for, or in connection with, the service Participant may provide as a director of a Subsidiary of the Company;

(g) the future value of the Shares underlying the Restricted Stock Units is unknown, indeterminable and cannot be predicted with certainty;

(h) no claim or entitlement to compensation or damages shall arise from forfeiture of the Award resulting from Participant's termination of Continuous Status as an Employee or Consultant (for any reason whatsoever, whether or not later found to be invalid or in breach of employment laws in the jurisdiction where Participant is employed or providing service or the terms of Participant's employment or service agreement, if any), and in consideration of the grant of the Restricted Stock Units to which Participant is otherwise not entitled, Participant irrevocably agrees never to institute any claim against the Company, any Parent or Subsidiary of the Company or the Employer, waives Participant's ability, if any, to bring any such claim, and releases the Company, any Parent or Subsidiary of the Company and the Employer from any such claim; if, notwithstanding the foregoing, any such claim is allowed by a court of competent jurisdiction, then, by participating in the Plan, Participant shall be deemed irrevocably to have agreed not to pursue such claim and agrees to execute any and all documents necessary to request dismissal or withdrawal of such claim;

(i) in the event of Participant's termination of Continuous Status as an Employee or Consultant (for any reason whatsoever, whether or not later to be found invalid or in breach of employment laws in the jurisdiction where Participant is employed or providing service or the terms of Participant's employment or service agreement, if any), unless otherwise provided in this Agreement or Section 2(n) of the Plan or determined by the Company, Participant's right to vest in the Restricted Stock Units under the Plan, if any, will terminate effective as of the date that Participant is no longer actively providing services and will not be extended by any notice period (e.g., active services would not include any contractual notice period or any period of "garden leave" or similar period mandated under employment laws in the jurisdiction where Participant is employed or providing service or the terms of Participant's employment or service agreement, if any); the Administrator shall have the exclusive discretion

to determine when Participant is no longer actively providing services for purposes of the Award (including whether Participant may still be considered to be providing services while on an approved leave of absence); and

(j) the following provisions apply only if Participant is providing services outside the United States:

(i) the Restricted Stock Units and the Shares underlying the Restricted Stock Units are not part of normal or expected compensation or salary for any purpose;

(ii) Participant acknowledges and agrees that the Company, any Parent or Subsidiary of the Company, and the Employer shall not be liable for any foreign exchange rate fluctuation between Participant's local currency and the United States Dollar that may affect the value of the Restricted Stock Units or of any amounts due to Participant pursuant to the settlement of the Restricted Stock Units or the subsequent sale of any Shares acquired upon settlement.

13. Choice of Language. Participant has received this Agreement and any other related communications (including the Notice of Grant) and consents to having received these documents solely in English.

14. No Advice Regarding Award. The Company is not providing any tax, legal or financial advice, nor is the Company making any recommendations regarding Participant's participation in the Plan, or Participant's acquisition or sale of the underlying Shares. Participant is hereby advised to consult with Participant's own personal tax, legal and financial advisors regarding Participant's participation in the Plan before taking any action related to the Plan.

15. Data Privacy Consent.

(a) Participant hereby explicitly and unambiguously consent to the collection, use and transfer, in electronic or other form, of Participant's personal data as described in this Agreement and any other Restricted Stock Unit grant materials by and among, as applicable, the Employer, the Company and its Parent or other Subsidiaries for the exclusive purpose of implementing, administering and managing Participant's participation in the Plan.

(b) Participant understands that the Company and the Employer may hold certain personal information about Participant, including, but not limited to, Participant's name, home address and telephone number, email address, date of birth, social insurance number, passport or other identification number, salary, nationality, job title, any Shares or directorships held in the Company, details of all Restricted Stock Units or any other

entitlement to Shares awarded, canceled, vested, unvested or outstanding in Participant's favor ("Data"), for the exclusive purpose of implementing, administering and managing the Plan.

*(c) Participant understands that Data will be transferred to E*TRADE Financial and/or such other stock plan service provider as may be selected by the Company in the future, which is assisting the Company with the implementation, administration and management of the Plan. Participant understands that the recipients of the Data may be located in the United States or elsewhere, and that the recipients' country (e.g., the United States) may have different data privacy laws and protections than Participant's country. Participant understands that if he or she resides outside the United States, he or she may request a list with the names and addresses of any potential recipients of the Data by contacting his or her local human resources representative. Participant authorizes the Company, E*TRADE Financial and/or any other possible recipients which may assist the Company (presently or in the future) with implementing, administering and managing the Plan to receive, possess, use, retain and transfer the Data, in electronic or other form, for the sole purpose of implementing, administering and managing his or her participation in the Plan. Participant understands that Data will be held only as long as is necessary to implement, administer and manage Participant's participation in the Plan. Participant understands that if he or she resides outside the United States he or she may, at any time, view Data, request information about the storage and processing of Data, require any necessary amendments to Data or refuse or withdraw the consents herein, in any case without cost, by contacting in writing his or her local human resources representative. Further, Participant understands that he or she is providing the consents herein on a purely voluntary basis. If Participant does not consent, or if Participant later seeks to revoke his or her consent, his or her employment status or service with the Employer will not be affected; the only consequence of refusing or withdrawing Participant's consent is that the Company would not be able to grant Participant Restricted Stock Units or other equity awards or administer or maintain such awards. Therefore, Participant understands that refusing or withdrawing his or her consent may affect Participant's ability to participate in the Plan. For more information on the consequences of Participant's refusal to consent or withdrawal of consent, Participant understands that he or she may contact his or her local human resources representative.*

16. Grant is Not Transferable. Except to the limited extent provided in paragraph 5, this grant and the rights and privileges conferred hereby will not be transferred, assigned, pledged or hypothecated in any way (whether by operation of law or otherwise) and will not be subject to sale under execution, attachment or similar process. Upon any attempt to transfer, assign, pledge, hypothecate or otherwise dispose of this grant, or any right or privilege conferred

hereby, or upon any attempted sale under any execution, attachment or similar process, this grant and the rights and privileges conferred hereby immediately will become null and void.

17. Binding Agreement. Subject to the limitation on the transferability of this grant contained herein, this Agreement will be binding upon and inure to the benefit of the heirs, legatees, legal representatives, successors and assigns of the parties hereto.

18. Restrictions on Sale of Securities. The Shares issued as payment for vested Restricted Stock Units under this Agreement will be registered under U.S. federal securities laws and will be freely tradable upon receipt. However, Participant's subsequent sale of the Shares may be subject to any market blackout-period that may be imposed by the Company and must comply with the Company's insider trading policies, and any other applicable securities laws.

19. Additional Conditions to Issuance of Stock. If at any time the Company will determine, in its discretion, that the listing, registration or qualification of the Shares upon any securities exchange or under any state or federal law, or the consent or approval of any governmental regulatory authority is necessary or desirable as a condition to the issuance of Shares to Participant (or his or her estate), such issuance will not occur unless and until such listing, registration, qualification, consent or approval will have been effected or obtained free of any conditions not acceptable to the Company. The Company will make all reasonable efforts to meet the requirements of any such state or federal law or securities exchange and to obtain any such consent or approval of any such governmental authority.

20. Plan Governs. This Agreement is subject to all terms and provisions of the Plan. In the event of a conflict between one or more provisions of this Agreement and one or more provisions of the Plan, the provisions of the Plan will govern. Capitalized terms used and not defined in this Agreement will have the meaning set forth in the Plan.

21. Administrator Authority. The Administrator will have the power to interpret the Plan and this Agreement and to adopt such rules for the administration, interpretation and application of the Plan as are consistent therewith and to interpret or revoke any such rules (including, but not limited to, the determination of whether or not any Restricted Stock Units have vested). All actions taken and all interpretations and determinations made by the Administrator in good faith will be final and binding upon Participant, the Company and all other interested persons. No member of the Administrator will be personally liable for any action, determination or interpretation made in good faith with respect to the Plan or this Agreement.

22. Electronic Delivery and Acceptance. The Company may, in its sole discretion, decide to deliver any documents related to Restricted Stock Units awarded under the Plan or

future Restricted Stock Units that may be awarded under the Plan by electronic means or request Participant's consent to participate in the Plan by electronic means. Participant hereby consents to receive such documents by electronic delivery and agrees to participate in the Plan through any on-line or electronic system established and maintained by the Company or another third party designated by the Company.

23. Captions. Captions provided herein are for convenience only and are not to serve as a basis for interpretation or construction of this Agreement.

24. Agreement Severable. In the event that any provision in this Agreement will be held invalid or unenforceable, such provision will be severable from, and such invalidity or unenforceability will not be construed to have any effect on, the remaining provisions of this Agreement.

25. Modifications to the Agreement. This Agreement constitutes the entire understanding of the parties on the subjects covered. Participant expressly warrants that he or she is not accepting this Agreement in reliance on any promises, representations, or inducements other than those contained herein. Modifications to this Agreement or the Plan can be made only in an express written contract executed by a duly authorized officer of the Company. Notwithstanding anything to the contrary in the Plan or this Agreement, the Company may amend this Agreement as necessary to comply with Section 409A or to otherwise avoid imposition of any additional tax or income recognition under Section 409A in connection to this award of Restricted Stock Units.

26. Amendment, Suspension or Termination of the Plan. By accepting this Award, Participant expressly warrants that he or she has received an Award of Restricted Stock Units under the Plan, and has received, read and understood a description of the Plan. Participant understands that the Plan is discretionary in nature and may be amended, suspended or terminated by the Company at any time.

27. Appendix. Notwithstanding any provisions in this Agreement and the Notice of Grant, this Award of Restricted Stock Units shall be subject to any special terms and conditions set forth in any Appendix to this Agreement for Participant's country. Moreover, if Participant relocates to one of the countries included in the Appendix, the special terms and conditions for such country will apply to Participant, to the extent the Company determines that the application of such terms and conditions is necessary or advisable for legal or administrative reasons. The Appendix constitutes part of this Agreement and the RSU Notice of Grant.

28. Governing Law and Venue. This Agreement will be governed by the laws of the State of California, without giving effect to the conflict of law principles thereof. For purposes of litigating any dispute that arises under this Award of Restricted Stock Units or this Agreement, the parties hereby submit to and consent to the jurisdiction of the State of California, and agree that such litigation will be conducted in the courts of Santa Clara County, California, or the federal courts for the United States for the Northern District of California, and no other courts, where this Award of Restricted Stock Units is made and/or to be performed.

29. Imposition of Other Requirements. The Company reserves the right to impose other requirements on Participant's participation in the Plan, on the Award of Restricted Stock Units and on any Shares acquired under the Plan, to the extent the Company determines it is necessary or advisable for legal or administrative reasons, and to require Participant to sign any additional agreements or undertakings that may be necessary to accomplish the foregoing.

30. Waiver. Participant acknowledges that a waiver by the Company of breach of any provision of this Agreement shall not operate or be construed as a waiver of any other provision of this Agreement, or of any subsequent breach by Participant any other Participant of the Plan.

31. Insider Trading Notification. Participant acknowledges that, depending on his or her country, Participant may be subject to insider trading restrictions and/or market abuse laws, which may affect his or her ability to acquire or sell shares or rights to shares (e.g., Restricted Stock Units) under the Plan during such times as Participant is considered to have "inside information" regarding the Company (as defined by the laws in Participant's country). Any restrictions under these laws or regulations are separate from and in addition to any restrictions that may be imposed under any applicable Company insider trading policy. Participant acknowledges that it is his or her responsibility to comply with any applicable restrictions, and Participant should speak to his or her personal advisor on this matter.

32. Foreign Asset/Account Reporting Notification. Participant understands that his or her country may have certain exchange control and/or foreign asset/account reporting requirements which may affect Participant's ability to acquire or hold Shares under the Plan or cash received from participating in the Plan (including from any dividends received or sale proceeds arising from the sale of Share) in a brokerage or bank account outside of Participant's country. Participant may be required to report such accounts, assets or transactions to the tax or other authorities in Participant's country. Participant acknowledges that it is his or her responsibility to comply with any applicable regulations, and Participant should speak to his or her personal advisor on this matter.

HARMONIC INC. AND SUBSIDIARIES**SUBSIDIARIES OF THE REGISTRANT**

The following table lists the direct and indirect subsidiaries of Harmonic Inc. as of December 31, 2017:

Name	State or Other Jurisdiction of Incorporation or Organization
Harmonic Delaware, L.L.C.	U.S.A.
Harmonic Germany GmbH	Germany
Harmonic Global Limited	Cayman Islands
Harmonic Japan GK	Japan
Harmonic India Private Limited	India
Harmonic International A.G.	Switzerland
Harmonic International Inc.	U.S.A.
Harmonic International Limited	Bermuda
Harmonic Lightwaves (Israel) Ltd.	Israel
Harmonic Poland Sp. Z.o.o	Poland
Harmonic Singapore P.T.E. Ltd.	Singapore
Harmonic Spain SL	Spain
Harmonic Technologies (HK) Limited	Hong Kong
Harmonic (UK) Limited	United Kingdom
Harmonic Video Networks Ltd.	Israel
Horizon Acquisition Ltd.	Israel
Harmonic Brasil LTDA	Brazil
Harmonic S.R.I.	Argentina
Harmonic Mexico International	Mexico
Harmonic Video Networks Malaysia Sdn Bhd	Malaysia
Harmonic International Australia Pty Ltd	Australia
Harmonic Italia Srl	Italy
Harmonic Tecnologias (Beijing) Co. Ltd	China
Kepler M2 SAS	France
Financiere Kepler SAS	France
Kepler SAS	France
Harmonic SAS	France
Thomson Video Networks Asia Pacific Pte. Ltd.	Singapore
Thomson Video Networks India Private Ltd	India
Thomson Video Networks Technology (Beijing) Co., Ltd.	China
Thomson Video Networks (UK) Limited	United Kingdom
Thomson Video Networks Do Brazil LTDA	Brazil

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-38025, 333-65051, 333-86649, 333-84720, 333-91464, 333-116467, 333-136425, 333-154715, 333-159877, 333-167197, 333-176211, 333-182931, 333-192089, 333-200032, 333-207866, 333-212242 and 333-218902) of Harmonic Inc. of our report dated March 5, 2018 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP

San Jose, California

March 5, 2018

HARMONIC INC.**CERTIFICATION**

I, Patrick J. Harshman, certify that:

1. I have reviewed this Annual Report on Form 10-K of Harmonic 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 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: March 5, 2018

By: /s/ Patrick J. Harshman

Patrick J. Harshman

President and Chief Executive Officer

(Principal Executive Officer)

HARMONIC INC.**CERTIFICATION**

I, Sanjay Kalra, certify that:

1. I have reviewed this Annual Report on Form 10-K of Harmonic 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 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: March 5, 2018

By: /s/ Sanjay Kalra

Sanjay Kalra

Chief Financial Officer

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

As of the date hereof, I, Patrick J. Harshman, President and Chief Executive Officer of Harmonic Inc. (the "Company"), certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the annual report of the Company on Form 10-K for the fiscal year ended December 31, 2017, as filed with the Securities and Exchange Commission (the "Report"), fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company. This written statement is being furnished to the Securities and Exchange Commission as an exhibit accompanying such Report and shall not be deemed filed pursuant to the Securities Exchange Act of 1934, as amended.

Date: March 5, 2018

/s/ Patrick J. Harshman

Patrick J. Harshman
President and Chief Executive Officer

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

As of the date hereof, I, Sanjay Kalra, Chief Financial Officer of Harmonic Inc. (the "Company"), certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the annual report of the Company on Form 10-K for the fiscal year ended December 31, 2017, as filed with the Securities and Exchange Commission (the "Report"), fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company. This written statement is being furnished to the Securities and Exchange Commission as an exhibit accompanying such Report and shall not be deemed filed pursuant to the Securities Exchange Act of 1934, as amended.

Date: March 5, 2018

/s/ Sanjay Kalra

Sanjay Kalra
Chief Financial Officer