CALIX, INC
Form 10-K
March 14, 2018

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-K

(Mark One)
x ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2017
OR
o TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to
Commission File Number: 001-34674

Calix, Inc.
(Exact Name of Registrant as Specified in Its Charter)

| | |
|---|---|
| Delaware<br>(State or Other Jurisdiction of Incorporation or Organization) | 68-0438710<br>(I.R.S. Employer Identification No.) |
| 1035 N. McDowell Blvd.<br>Petaluma, California<br>(Address of Principal Executive Offices) | 94954<br>(Zip Code) |

Registrant’s telephone number, including area code (707) 766-3000

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

| Title of each class | Name of each exchange on which registered |
|---|---|
| Common Stock, $0.025 par value | The New York Stock Exchange |

Securities registered pursuant to section 12(g) of the Act:
None
(Title of class)

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes: o No: x
Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes: o No: x
Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes: x No: o
Indicate by check mark whether the registrant has submitted electronically 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

(§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files).  Yes: x  No: o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of 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. x

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

| | | | |
|---|---|---|---|
| Large Accelerated Filer | o | Accelerated Filer | x |
| Non-accelerated filer | o (Do not check if a smaller reporting company) | Smaller Reporting Company | o |
| Emerging Growth Company | o | | |

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

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

The aggregate market value of the Common Stock held by non-affiliates of the registrant based upon the closing sale price on the New York Stock Exchange on June 30, 2017, the last business day of the Registrant's most recently completed second fiscal quarter, was approximately $294 million. Shares held by each executive officer, director and by each other person (if any) who owns more than 10% 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.

As of March 2, 2018, the number of shares of the registrant's common stock outstanding was 51,708,364.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement for its 2018 annual meeting of stockholders are incorporated by reference in Items 10, 11, 12, 13 and 14 of Part III.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This report includes forward-looking statements that involve substantial risks and uncertainties. All statements other than statements of historical facts contained in this report, including statements regarding Calix's future financial position, business strategy and plans and objectives of management for future operations, are forward-looking statements. In some cases, you can identify forward-looking statements by terminology such as "believe," "could," "expect," "may," "estimate," "continue," "anticipate," "intend," "should," "plan," "predict," "will," "would," "project," "potential" or the terms or other similar expressions. Forward-looking statements include Calix's expectations concerning the outlook for its business, productivity, plans and goals for future operational improvements and capital investments, operational performance, future market conditions or economic performance and developments in the capital and credit markets and expected future financial performance.

Forward-looking statements involve a number of risks, uncertainties and assumptions, and actual results or events may differ materially from those projected or implied in those statements. Important factors that could cause such differences include:

- our ability to predict our revenue and reduce and control costs related to our products or service offerings, including larger scale turnkey network improvement projects that may span several quarters;
- our ability to increase our sales to larger communications service providers, or CSPs, globally;
- the capital spending patterns of CSPs, and any decrease or delay in capital spending by CSPs due to macro-economic conditions, regulatory uncertainties, or other reasons;
- the impact of government-sponsored programs on our customers;
- intense competition;
- our ability to develop new products or enhancements that support technological advances and meet changing CSP requirements;
- our ability to achieve market acceptance of our products and CSPs' willingness to deploy our new products;
- the concentration of our customer base as well as our dependence on a limited number of key customers;
- the length and unpredictability of our sales cycles and timing of orders;
- our lack of long-term, committed-volume purchase contracts with our customers;
- our exposure to the credit risks of our customers;
- fluctuations in our gross margin;
- the interoperability of our products with CSP networks;
- our dependence on sole-, single- and limited-source suppliers;
- our ability to manage our relationships with our third-party, including contract manufacturers, ODMs, logistics providers, component suppliers and development partners;
- our ability to forecast our manufacturing requirements and manage our inventory;
- our products' compliance with industry standards;
- our ability to expand our international operations;
- our ability to protect our intellectual property and the cost of doing so;
- the quality of our products, including any undetected hardware defects or bugs in our software;
- our ability to estimate future warranty obligations due to product failure rates;
- our ability to obtain necessary third-party technology licenses at reasonable costs;
- the regulatory and physical impacts of climate change and other natural events;
- the attraction and retention of qualified employees and key management personnel;
- our ability to build and sustain an adequate and secure information technology infrastructure; and
- our ability to maintain proper and effective internal controls.

Calix cautions you against placing undue reliance on forward-looking statements, which reflect our current beliefs and are based on information currently available to us as of the date a forward-looking statement is made.

Forward-looking statements set forth in this Annual Report on Form 10-K speak only as of the date of its filing. We undertake no obligation to revise forward-looking statements to reflect future events, changes in circumstances or changes in beliefs. In the event that we do update any forward-looking statements, no inference should be made that we will make additional updates with respect to that statement, related matters or any other forward-looking statements.

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# PART I

## ITEM 1. Business

### Company Overview

Calix, Inc. (together with its subsidiaries, “Calix,” “we,” “our” or “us”) was incorporated in August 1999 and is a Delaware corporation. Calix is the leading global provider of cloud and software platforms, systems and services required to deliver the unified access network and smart premises of tomorrow. Our mission is to connect everyone and everything. Calix platforms empower our customers to build new business models, rapidly deploy new services and make the promise of the smart home and business a reality. Innovative CSPs rely on Calix platforms to help them master and monetize the complex infrastructure between their subscribers and the cloud. Our platforms and services help our customers build next generation networks by embracing a DevOps operating model, optimizing the subscriber experience by leveraging big data analytics and turning the complexity of the smart home and business into new revenue streams.

We are the pioneer in software defined access, or SDA, and our portfolio of solutions is designed to help CSPs meet emerging threats from web-scale players and reinvent how they serve their device-enabled subscribers. Our platforms enable our customers to capitalize on the opportunity that is being generated by the Internet of Things, or IoT, augmented and virtual reality applications and autonomous technologies. Our customers who are embracing our strategic platforms recognize that providing a sensational subscriber experience via an infrastructure that is Always On, can be enhanced at a DevOps pace and is intelligent enough to run itself enables them to compete in the future. We also provide cloud analytics designed to help service providers create and market new offerings that monetize their investments in the network. Finally, we strive to put our customers and their brands first to ensure that they will always have a central place in their subscribers’ lives. Our solution strategy is intended to help our customers build and re-enforce their brand presence within their subscribers’ premises. We believe this must be an element of their strategy for sustaining and growing their businesses.

Our current customers include CSPs of almost every size and type. Our solutions may be used by any entity providing communications services to a subscriber. This universe includes local and competitive exchange carriers, cable operators, wireless internet service providers, or wireless ISPs, over builders such as municipalities and electric cooperatives, hospitality providers and others globally. We market and sell our portfolio to CSPs globally through our direct sales force as well as in partnership with a number of resellers. We have enabled over 1,400 customers to deploy gigabit passive optical network, or GPON, Active Ethernet and point-to-point Ethernet fiber access networks.

We have a single reportable operating segment. Additional information about geographic areas required by this item is incorporated herein by reference to Note 13, “Segment Information” of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

### Industry Background and Trends

CSPs compete in a rapidly changing market to deliver a range of services to their residential and business subscribers. Subscribers now purchase an array of services from providers, starting with basic voice and data through advanced broadband services such as high-speed Internet, Internet protocol television, or IPTV, mobile broadband, high-definition and ultra high-definition video, and over-the-top video and online gaming from a variety of CSPs. Consumers are also rapidly adding devices that require high bandwidth, low latency services such as virtual and augmented reality as well as IoT devices that bring significant complexity to the premises network. It is likely that adoption of autonomous technologies such as self-driving cars will dramatically increase demand and complexity.

The rapid growth in new technologies is generating increased network traffic and putting pressure on CSPs to cost effectively upgrade and enhance their networks to meet demand. For example, Cisco Systems, Inc. estimates that global Internet protocol, or IP, traffic will grow at a compound annual growth rate of 24% per year from 2016 to reach approximately 278 exabytes per month in 2021. At the same time, the proliferation of new technologies creates a tremendous opportunity for CSPs to offer new services and revenue streams by mastering the complexity of the smart home and business for their subscribers.

### The Emergence of Web-Scale Players as a Competitive Force

The level of competition among CSPs – wireline and wireless service providers, cable multiple system operators, or cable MSOs, and other CSPs – has increased over the last decade as traditional service boundaries have fallen. All providers are now competing for the same residential and business subscribers using similar types of IP-based services. The explosion of new technologies in the subscriber premises creates significant new opportunities for all CSPs. Technology innovators of all types and sizes are moving aggressively to seize that opportunity. Perhaps the most significant recent change in the competitive dynamic across the communications space is the aggressive entrance of web-scale players into subscribers' homes and

businesses. These entrants, such as Google and Amazon, are extending their current platforms (e.g., data driven search, e-commerce) into the subscriber premises with new devices and services that are helping to reshape the home environment. Their use of data enables them to rapidly deploy new services and command a central place in the subscriber's daily life. The level of insight that they generate by mining user data, coupled with their DevOps business model, positions them to offer and deploy services to subscribers at pace that a traditional CSP model cannot match.
To address this challenge and establish control of the device-enabled subscriber, CSPs must respond by leveraging analytical tools that utilize network data and subscriber behavioral data to tailor services that meet the individual subscribers' needs. These services include high-bandwidth packages, managed Wi-Fi, whole home Wi-Fi and smart home services. We believe these new services represent the CSPs' greatest opportunity to create new revenue streams and higher average revenue per user, or ARPU, while reducing churn. CSPs must also mine network and subscriber data to streamline and automate subscriber facing functions such as customer service. These data-driven approaches can significantly reduce service costs, improve profitability and support investment in new services and technologies. Increasingly, companies in the communications space will embrace strategies that apply machine learning and artificial intelligence technologies that promise to dramatically improve the subscriber experience, build subscriber intimacy and loyalty while increasing ARPU. By leveraging data to build a tighter bond with their subscribers and deliver high-value services, CSPs can more effectively meet the challenge presented by web-scale players.

The Rise of Smart Premises

In many ways 2017 was a significant inflection point for the smart home market. The Amazon Echo was the top selling item on the entire Amazon marketplace – reaching 22 million units sold and selling-out during the year-end holiday season. IoT, virtual reality and other connected devices have become mainstream for many consumers and they are increasingly prevalent on subscriber premises. Parks and Associates estimates that the proliferation of connected home devices has led to an average of 9.1 connected devices per U.S. broadband home and projects annual sales of all connected home devices reaching 442 million units by 2020. McKinsey and Company, Incorporated estimates that globally the total IoT market will grow at a 32.6% compounded annual growth rate through 2020. These connected devices are already creating complexity and management challenges for the CSPs who are often contacted by their subscribers when performance issues arise. Increasingly, subscribers view any device that is connected to home network as the purview and responsibility of their CSP. As the number and type of devices continues to expand, CSPs must develop strategies and adopt technologies that help them manage the complexity.
To improve performance and coverage throughout their homes, many subscribers are purchasing Wi-Fi routers and gateways via consumer channels and introducing them into the home network. These devices compound management challenges for CSPs as the subscribers generally contact their CSP when issues arise with the Wi-Fi performance. Since these consumer devices do not provide carrier class management capabilities that enable remote diagnostics, management and trouble-shooting, performance issues can create a cost burden for the service provider and satisfaction issues for the subscriber.
Recognizing that many subscribers see the CSP as the logical source of insights and services that enable the smart home and business, innovative CSPs are developing strategies and business models that embrace these new technologies via carrier class premises systems. Over the last year, several of the largest and most innovative CSPs have announced strategies that incorporate the latest technologies such as voice interaction and IoT connectivity. By leveraging cloud management technologies and developing a proactive strategy for smart device connectivity, voice interaction, security and premises system instrumentation, CSPs can position themselves as the critical enabler of the smart home and business. Winners will embrace software platforms that enable all of these capabilities and premises systems that provide a foundation for turning the burden of the smart home into new services and revenue streams.

The Shift to a DevOps Business Model

Access networks, traditionally known as the local loop or last mile, directly and physically connect the residential or business subscriber to the CSP's data center, central office or similar facilities and create the onramp to the Internet. The access network is critical for service delivery as it governs the bandwidth capacity, service quality available to subscribers and ultimately the services and experience CSPs can provide to subscribers. Providing differentiated, high-quality, high-speed connectivity has become increasingly critical for CSPs to retain and expand their subscriber base and launch new revenue-generating services. To meet the demands of device-enabled subscribers, CSPs are starting to deploy access technologies that are software defined and leverage next generation Passive Optical Network, or PON, architectures such as NG-PON2, XGS-PON and 10G EPON. In doing so they will address many of limitations of legacy access systems:

- Limited capacity of outdated access architectures – Network architectures have physical limitations in their ability to scale bandwidth, avoid latency issues and deliver the advanced broadband services subscribers demand today and are expected to increasingly demand in the future.

- Inflexible networks that constrain subscriber offerings – Networks were designed to support a narrow range of services, and as a result, they limit the ability of CSPs to deploy the advanced broadband services increasingly demanded by their subscribers.
- Expensive to deploy and operate – With a wide variety of equipment installed, networks require significant downtime and labor for maintenance and upgrades, thereby placing a significant and recurring capital and operating expense burden on CSPs.
- Back-office systems slow deployment of new services – Traditional methods for operationalizing new products and services often require significant testing and lengthy back-office integration activities. This often places CSPs at a competitive disadvantage relative to emerging service providers that are leveraging agile management practices.

By replacing traditional hardware functions with software defined networking, or SDN, CSPs can overcome these operational challenges and bring new products and services to market faster. Many CSPs are embracing SDN and SDA to help accelerate innovation, deploy automation, bring agility to their network and significantly reduce service disruptions. By embracing standards-based, modular software platforms that abstract software functions from hardware, CSPs can free themselves from a dependence on specific hardware technologies and upgrade their access network to enable a DevOps business model. The winning service providers of the future will embrace SDA platforms and transform their access networks into a competitive weapon. Ultimately, this new model will enable CSPs to manage a complete range of access systems across nearly every deployment scenario (e.g., central office, head-end, cabinet, mounted on a pole) in a consistent manner. With this shift they will introduce services at a pace that can then match the speed of the web-scale players.

The imperative to develop lean operating models

CSPs face a dual challenge in the coming years – mounting competitive pressure and the requirement to increase their investments in technologies that can deliver the new services that their subscribers will demand. Most will need to make shifts in their operating models to thrive in the coming decade. They must implement a lean operating model that reduces the cost to run the business and deliver services to subscribers at an accelerated pace and at a significantly lowered cost. The adoption of new technologies that provide automation and intelligence, such as SDA, will help service providers adopt agile operating models and reduce the burden of network and back-office operations.

The role of governments in supporting technology investment

As CSPs face increasing competitive pressure, they must accelerate their investments to upgrade their access networks and deploy new subscriber facing technologies. Governments around the world recognize the importance of expanding broadband networks and delivering advanced broadband services to more people and businesses. As a result, many governments have established stimulus programs or other incentives for broadband investment.

In the United States, programs like the Connect America Fund, or CAF, and E-Rate provide billions of dollars each year to CSPs in the form of capital investment incentives, grants and loans to encourage broadband network investment in unserved or underserved communities and schools. For example, in 2015, the CAF program was authorized to distribute $1.5 billion per year through 2020 to offset the costs of installing and operating CSP operated broadband and voice networks for Tier 1 and Tier 2 service providers in the United States. In 2016, this program was extended to the Tier 3 service providers to distribute $2.0 billion annually over the next ten years to offset the costs of installing and operating CSP operated broadband and voice networks. In addition, the E-Rate program was authorized to offer $1.5 billion in grants to build gigabit capable network connections to schools. The E-Rate program targeted at networks is funded at its current level indefinitely. The Canadian Radio-television and Telecommunications Commission in 2016 created a fund targeted at increasing broadband coverage and speeds that made available up to $750 million available over the next five years, and the European Commission is pursuing similar goals via its Connecting Europe Facility and other programs.

With the increasing importance of broadband connectivity and the evolution of the smart home and business market, we expect this investment focus to continue and potentially increase. World-class connectivity and service are becoming essential capabilities for individuals, as well as businesses and nations who strive to remain economically competitive in an increasingly global and connected market place.

Strategy Overview

We believe that many CSPs can and will evolve to providing the most relevant services and experience to their subscribers. Today, many CSPs command a privileged and strategic position in their subscribers' premises. They provide a service that is becoming a necessity for many subscribers. With significant new technologies coming into the marketplace, the opportunities to generate new revenue streams are manifold. However, the journey from connectivity provider to essential provider of high bandwidth connectivity and services to the smart home and business will require significant transformation for most CSPs. Our strategy is to position Calix as the essential provider of platforms and services that enable this transformation. The principal elements of our strategy are:

Increase Focus on Strategic Platforms – Our strategy centers on our three strategic platforms – Calix Cloud, EXOS (Experience eXtensible Operating System) and AXOS (Access eXtensible Operating System).

- Calix Cloud is a cloud analytics platform that leverages network data and subscriber behavioral data to deliver analytics and intelligence to communications professionals via role specific dashboards. Calix Cloud provides the subscriber analytics to deliver the targeted services and experiences to build customer intimacy and loyalty.
- EXOS is a carrier class premises operating system that supports residential, business and mobile subscribers. EXOS, coupled with our market leading GigaFamily premises systems, provides a unique platform for mastering and monetizing the complexity of the smart home and business.
- AXOS is an operating system for access networks that allows a service provider to deliver all services on a single, elastic, converged access network that is always on. AXOS, coupled with our eSeries systems, provides a unique platform for the software defined access network that enables CSPs to transform their business processes and deliver new services at DevOps speed.

Extend Portfolio of Calix Services – Our services team assists CSPs define their transformation strategy, build new skills, implement new technologies and deploy new subscriber services. Calix Services addresses a CSP’s entire network and service delivery lifecycle.

Engage Directly with Customers – Calix continues to invest in our direct sales capabilities to ensure that we engage deeply with our customers to help them understand the differentiable value that our platforms deliver. As an innovator and a market leader, it is important that our sales and solution engineering resources continually drive the adoption of our strategic platforms. Our direct model is complemented outside of North America with a selective program for Calix Channel Partners who have established local market expertise and demonstrated the ability to generate new market opportunities and support sales of cutting-edge technologies.

Expand Customer Footprint Across Our Expanded Total Addressable Market – Our diverse and growing customer footprint is a critical source of our growth as we expand our portfolio and sell additional platforms to both new and existing customers. Our platforms have dramatically expanded our total addressable market, and as such we intend to build on our recent momentum in penetrating service provider segments where our current share is relatively low (e.g., cable MSO, Tier 1 telecommunications providers and international markets) and continue to engage emerging providers who are creating entirely new customer segments (e.g., utilities and hospitality).

Pursue Strategic Relationships – We expect to continue to pursue strategic technology and distribution relationships, alliances and acquisitions that help us align us with CSPs’ strategic priorities. We continue to invest to assure interoperability across the ecosystems that support our customers’ most critical business processes through our Calix Compatible Program. This program has dozens of technology members and it is designed to enable our customers to rapidly deploy qualified solutions globally.

Portfolio Overview

By embracing open, modular, standards-based strategies, we provide intelligence and flexibility across a CSP’s entire network – from their data centers to their subscribers’ connected devices. Calix platforms are designed to provide our customers the agility that they need to offer the managed services that their subscribers demand. While we continue to support our non-AXOS and non-EXOS systems and our traditional cloud and software products, we are focused on driving the evolution and market penetration of our strategic platforms and services.

The Calix portfolio allows for a broad range of subscriber services to be provisioned and delivered over a single unified network. These systems can deliver voice and data services, advanced broadband services, mobile broadband, as well as high-definition video and online gaming. Our premises systems allow CSPs to master the complexity of the smart home and business and offer new services to their device enabled subscribers. All of these platforms and systems can be monitored, analyzed, managed and supported by Calix Cloud.

Representation of how Calix platforms and services support a CSP's entire network:

Calix Cloud

Calix Cloud is an analytics platform that leverages network data and subscriber behavioral data to deliver intelligence to communications professionals via role specific dashboards. Calix Cloud provides customer support personnel with troubleshooting dashboards and tailored analytics that reduce call volumes, reduce call times and lower "truck rolls". Calix Cloud provides marketing personnel with segmentation dashboards and tailored analytics that reduce churn, increase ARPU and improve marketing return on investment. Calix Cloud transforms insights into action for CSPs, enabling them to:

- Analyze: Calix Cloud allows CSPs a deeper understanding of their subscribers and their satisfaction. As a result, CSPs can directly address churn risk and improve marketing campaigns.
- Engage: Calix Cloud provides CSPs real-time insights into network issues, allowing CSPs to be responsive in resolving issues and offering solutions.
- Grow: Calix Cloud analytics combine multiple information sources to build a full picture of subscribers, which can enable higher marketing success rates.

Calix Cloud is composed of two subscription-based offerings that complement each other to provide a powerful platform that CSP employees utilize within their daily work flows to increase the effectiveness of their marketing campaigns, address support issues and improve the subscriber experience.

Representation that summarizes the main capabilities of Calix Cloud:

Calix Support Cloud (CSC) – Recent Calix studies demonstrate that a large portion of support calls result from Wi-Fi performance issues. Since Wi-Fi related support calls take approximately three-times as long to complete as the average support call, reducing these calls can significantly improve operational efficiency. CSC enables more informed and efficient conversations between CSP customer service representatives and their subscribers. Support personnel utilize troubleshooting dashboards and tailored analytics that are built directly into their work flows to quickly identify issues with network, devices and Wi-Fi performance. Once the issues are identified, many can be resolved via CSC with a simple click of a button. Recent enhancements to CSC include automation capabilities that can fix many common issues without any manual intervention. We intend to incorporate more advanced machine learning and artificial intelligence capabilities into CSC to help CSPs optimize their support processes and improve subscriber experiences.

Calix Marketing Cloud (CMC) – CMC enables marketers to move away from a one size fits all approach to marketing and deliver personalized campaigns. CMC provides insights regarding subscriber behavior including website visits, social channel engagement, device usage and bandwidth consumption. CMC also helps CSPs identify subscribers who are experiencing service issues and exhibiting behaviors that correlate with higher churn rates (e.g., running speed tests). By delivering these insights through intuitive segmentation dashboards and tailored analytics, CMC helps CSPs deliver the right message, at the optimal time, via the optimal channel. CMC enables CSPs to adopt data-driven strategies to effectively compete with web-scale players.

Calix Cloud software is hosted in a cloud data center and Calix offers an array of support and service offerings that are designed to ensure rapid deployment and easy adoption.

EXOS

EXOS is a carrier class premises operating system introduced in the fall of 2017 that supports residential, business and mobile subscribers. EXOS is the first carrier class premises operating system designed to help CSPs deliver a managed experience for the smart home and business. EXOS can help CSPs address the unique needs of every subscriber by helping them:

- Connect: Leverage the ecosystems, applications, cloud services and devices that deliver services to subscribers.
- Manage: Control the total subscriber experience while adapting to new technologies that are introduced into the home or business network.
- Secure: Provide software-enabled security with the ability to integrate with a global ecosystem of partners.
- Analyze: Improve the delivery of services by converting subscriber, device and network data into actionable insight.

Representation that summarizes the main capabilities of EXOS:

Approximately 50% of smart home device owners experience problems when setting up their devices. These challenges create opportunities for service providers who can eliminate these issues and remove the management burden from the subscriber. EXOS is designed to eliminate subscribers' smart device challenges and support a broad array of smart home technologies including IoT, virtual reality and home automation systems. EXOS incorporates a software model that is standards-based and fully abstracted from the hardware, providing CSPs with the flexibility to offer services on the premises system of their choice. This flexibility also allows CSPs to offer managed smart home and business services such as security and home automation. We expect to implement EXOS in the next generation of GigaFamily smart premises systems that will launch in 2018. The EXOS-powered GigaFamily will target both home and small-to-medium sized business use cases.

Representation of the next generation EXOS-powered GigaFamily:
While EXOS powered systems represent a significant inflexion point for the Calix premises portfolio, our current GigaFamily systems continue to offer CSPs a unique value proposition. As a carrier class system, the GigaCenter supports smart channel selection and dynamic frequency selection. The GigaCenter also supports interoperability with IPTV set top boxes and Wi-Fi analytics. When deployed in conjunction with the Calix Cloud, the GigaCenter provides the complete set of capabilities required for a fully managed Wi-Fi offering to deliver optimized services to subscribers.
With the recent introduction of the 804Mesh system to the GigaFamily, CSPs can now also offer a whole-home Wi-Fi service to their subscribers that is carrier class. When paired with the 804Mesh systems, the GigaCenter can extend Wi-Fi coverage to distant corners of the subscriber premises, enabling the highest quality connection throughout an entire home or small business network.
Representation of the Calix GigaCenter and 804Mesh satellite:

AXOS
AXOS is a software platform built for the specific needs of the access network. The AXOS platform is an architecture built to leverage the best of data center software design and network virtualization across the challenging and variable environment of the access network. With an always-on architecture and consistent provisioning services, a CSP can leverage AXOS to deliver all services on a single, elastic, converged access network that is always on. By supporting all existing and next generation PON architectures (anyPON), any silicon chipset (anyPHY) and any CSP operating model (anySDN), AXOS provides unmatched flexibility to our customers.

Representation that summarizes the main capabilities of AXOS:

We believe AXOS offers a revolutionary way for CSPs to operate their access network and accelerate their business transformation. AXOS achieves this through containerized software components that operate on top of a unique hardware abstraction layer that preserves software independence from the underlying hardware. This architecture simplifies upgrades to non-events, supports stateful, self-healing operation and facilitates virtualization of processes and services. All components and operational functions within AXOS use standard NETCONF protocol and YANG data models that enable AXOS-powered systems to fit into any open SDN orchestration and control framework. Open, published APIs also allow customers to directly program unique network applications and services.

With AXOS, CSPs can collapse and automate networks functions such a subscriber management and routing to streamline deployment of services and simplify operations. This functionality is supported via software modules including AXOS RPm (Routing Protocol module), AXOS SMm (Subscriber Management module) and connectors such as SMx (Service Management Connector), AXOS DPx (virtualized DOCSIS connector), AXOS OFx (OpenFlow connector) and AXOS Sandbox – an SDA virtual environment for system design and testing. The AXOS platform removes the complexity of network deployments by reducing the need for complex and costly integrated hardware and software that is pieced together via middleware. AXOS offers CSPs a path to the intelligent, unified access network that can accelerate time-to revenue, increase service velocity, eliminate service disruptions and reduce total cost of ownership.

AXOS is currently implemented in our E-series family of modular, non-blocking systems including the E9-2, E7-2, E3-2, E3-16F, E5-16F and E5 business systems. By offering AXOS on the entire eSeries family of systems, Calix offers our customers both small and large form factors that can be deployed in a variety of deployment scenario. The Calix Access system portfolio is designed for high availability and purpose-built for the demands of access network deployments. Our access systems are built and tested to meet or exceed network equipment-building system standards, which are a set of safety, spatial and environmental design guidelines for communications equipment. Our products are highly compatible and designed to be easily integrated into the existing operational and management infrastructure of CSP access networks.

Representation of the AXOS E-Series systems portfolio and where they are typically placed in the CSP network:

Traditional Products

Calix continues to support and sell our portfolio of non-AXOS and non-EXOS systems and traditional software and Compass Cloud products that are widely deployed in customer networks. For many CSPs, the process of operationalizing new systems and transitioning to new products can be lengthy. We expect that these products will continue to be utilized in our customers' networks for many years. These products include:

- Compass Cloud – Consists of Flow Analyze Plus (a tool that provides an in-depth view of the traffic in CSP networks on a real-time basis) and Consumer Connect Plus (a tool that enables service providers to remotely activate new broadband devices and manage home networks, creating new revenue sources, improved customer satisfaction and reduced service delivery costs) and Service Verify (a tool that gives service providers the tools to comprehensively validate quality of service commitments for their business subscribers).
- Non-AXOS E-Series Access Systems and Nodes: A small subset of our E-Series access systems and access nodes that are designed to support an array of advanced IP-based service and run our EXA operating system. These systems are not supported by AXOS.
- Calix C-Series Multiservice Access Systems: Designed to support a wide array of basic voice and data services offered by CSPs while also supporting advanced, high-speed, packet-based services such as Gigabit Ethernet, GPON, digital subscriber line, or DSL, (including very high-speed DSL 2, or VDSL2) and advanced applications.
- Calix B-Series Access Nodes – Consist of chassis-based nodes that are designed to support an array of advanced IP-based services offered by CSPs, including Ethernet transport and aggregation, as well as voice, data and video services over both fiber- and copper-based network architectures.
- P-Series Optical Network Terminals and Residential Gateways: A broad range of non-EXOS customer premises solutions, including optical network terminals, or ONTs, and residential gateways for residential and business use in conjunction with our E-Series, C-Series and B-Series systems.

Calix Services

Calix Services assists CSPs define their strategy, implement new services and manage their networks. CSPs choose Calix platforms because of their ability to simplify network management and support an agile service delivery model, and Calix Services spans the entirety of the network and service delivery lifecycle. Our expertise, developed over many years of building cutting-edge software platforms and providing critical services to our customers, positions us to be the vendor of choice. Today, the Calix Services team delivers services to CSPs of every size and every type. We intend to expand our portfolio of service offerings to ensure that our customers realize the full potential of our platforms.

- Calix Professional Services utilizes defined service packages to accelerate network design and deployment, optimize performance and scalability and apply field-proven best practices, processes and tools. Use Cases for Calix Professional Services includes the collapse of multiple network silos into a single software defined access architecture, the seamless migration to next-generation PON architectures, the deployment of managed whole home Wi-Fi services and facilitated OSS/BSS integration services.
- Calix Support and Managed Services: These offerings optimize CSP end-to-end processes, from operations to technology deployment to service lifecycle management. On our new platform-based products, Calix offers three tiers of support services that focus on software updates, the agility of operational workflows, service uptime and customer experience. Calix support tiers are designed to provide optimal support to our customers who are adopting our strategic platforms – Calix Cloud, EXOS and AXOS. On our traditional systems and cloud products, we continue to offer Calix Advantage support. Calix Managed Services focus on transitioning CSPs from reactive break-fix problem solving to a proactive analytics-driven approach. Calix technical and managed support options include technical support, remote monitoring and managed services.
- Calix Education Services: Calix offers an array of self-service and instructor-led, remote and onsite learning and certifications solutions to help CSPs build the skills required to successfully execute deployments and effectively run next generation networks.

Customers

We operate a differentiated customer engagement model that focuses on direct alignment with our customers through sales, service and support. In order to allocate our product development and sales efforts efficiently, we believe that it is critical to target markets, customers and applications deliberately. We have traditionally targeted CSPs, which own, build and upgrade their own access networks and value strong relationships with their systems and software suppliers.

The United States Incumbent Local Exchange Carrier, or ILEC, market is composed of three distinct “tiers” of carriers, which we categorize based on their subscriber line counts and geographic coverage. Tier 1 CSPs are very large with wide geographic footprints. They have greater than ten million subscriber lines, and they generally correspond with the former Regional Bell Operating Companies. Tier 2 CSPs also operate typically within a wide geographic footprint, but are smaller in scale with subscriber line counts that range from approximately half a million to approximately seven million subscriber lines. Their service coverage areas are predominantly regional in scope, and therefore they are often known as Regional Local Exchange Carriers. Tier 3 CSPs consist primarily of over 1,000 predominantly local operators (often called IOCs) typically focused on a single community or a cluster of communities, although they also include a growing number of municipalities, electric cooperatives, fiber over builders and wireless ISPs. These entities range in size from a few hundred to approximately half a million subscriber lines.

To date, we have focused primarily on CSPs in the North American market. Our existing customers’ networks serve over 100 million subscriber lines. In North America, our customers span Tier 1s, 2s and 3s, including Verizon Communications Inc.; CenturyLink, Inc., or CenturyLink; Frontier Communications Corporation; Windstream Holdings, Inc., or Windstream; Telephone and Data Systems, Inc., or TDS; Allo Communications; HTC Communications and Grande Communications. We serve many other major players in the broadband services market, including cable MSOs, utilities and municipalities.

We have a few large customers who have represented a significant portion of our sales in any given period. CenturyLink accounted for 31% of total revenue in 2017, 21% in 2016 and 22% in 2015. Windstream accounted for 15% of our revenue in 2016 and less than 10% of our revenue in 2017 and 2015.

Some of our customers within the United States use or expect to use government-supported loan programs or grants to finance capital spending. Loans and grants through Rural Utility Service, or RUS, which is a part of the United States Department of Agriculture, are used to promote the development of telecommunications infrastructure in rural areas.

Sales to customers outside the United States represented approximately 11% of our total revenue in 2017, 9% in 2016 and 12% in 2015. Historically, our sales outside the United States were predominantly to customers in the Caribbean, Canada and Europe.

Customer Engagement Model

We design, market and sell our Calix Cloud and software platforms, systems and Calix Services predominantly through our direct sales force, supported by marketing and product management personnel. We have expanded this model to include a small number of select channel partners in North America, dozens of international channel partners, who are part of our Fiber Forward Partner Program, and a global reseller relationship with Ericsson. Our sales effort is organized either by named accounts or regional responsibilities. Account teams comprise sales managers, supported by solution engineers and account managers, who work to target and sell to existing and prospective CSPs. The sales process includes analyzing CSPs’ existing networks and identifying how they can utilize our products and services within their networks. Even in circumstances where a channel partner is involved, our sales and marketing personnel are often selling side-by-side with the channel partner. We believe that our direct customer engagement approach provides us with significant differentiation in the customer sales process by aligning us more closely with our customers’ changing needs.

Research and Development

Continued investment in research and development is critical to our business. Our research and development team is composed of engineers with expertise in hardware, software and optics. Our teams of engineers are located in our Petaluma, San Jose and Santa Barbara facilities located in California; our Minneapolis, Minnesota facility and our Nanjing, China facility. We also outsource a portion of our software development to domestic and international third parties. Our research and development team is responsible for designing, developing and enhancing our Cloud and software platforms and systems, performing product and quality assurance testing and ensuring the compatibility of our products with third-party hardware and software products. We have made significant investments in the Calix portfolio. We intend to continue to dedicate significant resources to research and development to develop, enhance and deliver new platform features and capabilities, including investment in innovative technologies that support our business strategy. Our research and development expenses totaled $127.5 million in 2017, $106.9 million in 2016 and $89.7 million in 2015.

Manufacturing

We work closely with third parties to manufacture and deliver our products. Our manufacturing organization consists primarily of supply chain managers, new product introduction personnel and test engineers. We outsource our manufacturing and order fulfillment and tightly integrate our supply chain management and new product introduction activities. Although we have multiple contract manufacturing arrangements and original development manufacturers, or ODMs, we primarily utilize Flex Ltd., or Flex, as our contract manufacturer. Our relationship with Flex allows us to conserve working capital, reduce product costs and minimize delivery lead times while maintaining high product quality. Generally, new product introduction occurs in

Flex's facilities in Suzhou, China. Once product manufacturing quality and yields reach a satisfactory level, volume production and testing of circuit board assemblies also occur in Suzhou, China. Final system assembly and testing are performed in Flex's facilities in Guadalajara, Mexico. Order fulfillment is performed by Pegasus Logistics Group, Inc. in Texas. We also evaluate and utilize other vendors for various portions of our supply chain from time to time, including order fulfillment of our circuit boards. This model allows us to operate with lower inventory levels while maintaining the ability to scale quickly to handle increased order volume.

Product reliability is essential for our customers, who place a premium on continuity of service for their subscribers. We perform rigorous in-house quality control testing to help ensure the reliability of our systems. Our internal manufacturing organization designs, develops and implements complex test processes to help ensure the quality and reliability of our products.

The manufacturing of our products by contract manufacturers is a complex process and involves certain risks, including the potential absence of adequate capacity, the unavailability of or interruptions in access to certain process technologies and the reduced control over delivery schedules, manufacturing yields, quality and costs. As such, we may experience production problems or manufacturing delays. Additionally, shortages in components that we use in our systems are possible and our ability to predict the availability of such components, some sourced from a single or limited source of supply, may be limited. Our systems include some components that are proprietary in nature and only available from a single source, as well as some components that are generally available from a number of suppliers. The lead times associated with certain components are lengthy and preclude rapid changes in product specifications or delivery schedules. In some cases, significant time would be required to establish relationships with alternate suppliers or providers of proprietary components. We generally do not have long-term contracts with component providers that guarantee the supply of components or their manufacturing services. If we experience any difficulties in managing relationships with our contract manufacturers, or any interruption in our own operations or our contract manufacturers operations or if a supplier is unable to meet our needs, we may encounter manufacturing delays that could impede our ability to meet our customers' requirements and harm our business, operating results and financial condition. Our ability to deliver products in a timely manner to our customers would be adversely impacted materially if we needed to qualify replacements for any of the components used in our systems.

Seasonality

Fluctuations in our revenue occur due to many factors, including the varying budget cycles and seasonal buying patterns of our customers. More specifically, our customers tend to spend less in the first fiscal quarter as they are finalizing their annual capital spending budgets, and in certain regions, customers are also challenged by winter weather conditions that inhibit outside fiber deployment.

Intellectual Property

Our success depends upon our ability to protect our core technology and intellectual property. To accomplish this, we rely on a combination of intellectual property rights, including patents, trade secrets, copyrights and trademarks as well as customary contractual protections. In addition, we generally control access to and the use of our proprietary technology and other confidential information. This protection is accomplished through a combination of internal and external controls, including contractual protections with employees, contractors, customers and partners and through a combination of U.S. and international intellectual property laws.

As of December 31, 2017, we held 119 U.S. patents and had 14 pending U.S. patent applications. One of the U.S. patents is also covered by granted international patents in three countries. As of December 31, 2017, we had no pending international patent applications. U.S. patents generally have a term of twenty years from filing. We have added to our patent portfolio since our inception. The remaining terms on the individual patents vary from one to 19 years.

We rely on intellectual property laws as well as nondisclosure agreements, licensing arrangements and confidentiality provisions to establish and protect our proprietary rights. U.S. patent, copyright and trade secret laws afford us only limited protection and the laws of some foreign countries do not protect proprietary rights to the same extent. Our pending patent applications may not result in issued patents, and the issued patents may not be enforceable. Any infringement of proprietary rights could result in significant litigation costs. Further, any failure by us to adequately protect our proprietary rights could result in competitors offering similar products, resulting in the loss of our competitive advantage and decreased sales.

We believe that the frequency of assertions of patent infringement continues to increase in our industry. In particular, patent holders, including entities and organizations that purchase or hold patents to monetize such rights, assert patent infringement claims as a competitive tactic as well as a source of revenue. Any claim of infringement from a third party, even claims without merit, could cause us to incur substantial costs defending against such claims and could distract our management from operating our business. Furthermore, a party making such a claim, if successful, could secure a judgment that requires us to pay substantial damages. A judgment could also include an injunction or other court order that could prevent us from selling our products. In addition, we might be required to seek a license for the use of such intellectual property, which may not be available on commercially reasonable terms or at all. Alternatively, we may be required to develop non-infringing technology, which would require significant effort and expense and may ultimately not be successful.

Competition

The communications equipment market is highly competitive. Competition in this market is based on any one or a combination of the following factors:

- price;
- functionality;
- existing business and customer relationships;
- the ability of products and services, including turnkey professional services capabilities, to meet customers' immediate and future network requirements;
- product quality;
- installation capability;
- service and support;
- scalability; and
- manufacturing capability.

We compete with a number of companies within markets that we serve, and we anticipate that competition will intensify. Suppliers with which we compete include ADTRAN, Inc., or ADTRAN; Arris Group, Inc.; Ciena Corporation; Cisco Systems Inc.; Huawei Technologies Co. Ltd.; Juniper Networks Inc.; Nokia Corporation and ZTE Corporation. There are also a number of smaller companies with which we compete in various geographic or vertical markets, including DASAN Zhone Solutions, Inc. While most of these smaller competitors lack broad national scale and product portfolios, they can offer strong competition on a deal-by-deal basis. As we expand into adjacent markets, we expect to encounter new competitors. Many of our competitors have substantially greater name recognition, manufacturing capacity and technical, financial and marketing resources as well as better established relationships with CSPs than we do. Many of our competitors have greater resources to develop products or pursue acquisitions and more experience in developing or acquiring new products and technologies and in creating market awareness for their products and technologies. In addition, a number of our competitors have the financial resources to offer competitive products at below market pricing levels that could prevent us from competing effectively.

Employees

As of December 31, 2017, we employed a total of 1,031 employees, of which 762 employees were located in the United States. Our United States employees are not represented by a labor union with respect to their employment with us. Two of our French employees are subject to collective bargaining arrangements. We have not experienced any work stoppages, and we consider our relations with our employees to be good.

Corporate Information

Calix, Inc., a Delaware corporation, was founded in August 1999. Our principal executive offices are located at 1035 N. McDowell Boulevard, Petaluma, California 94954, and our telephone number is (707) 766-3000. Our website address is www.calix.com. We do not incorporate the information on or accessible through our website into this Annual Report on Form 10-K, and you should not consider any information on, or that can be accessed through, our website as part of this Annual Report on Form 10-K. Calix®, the Calix logo design, E3®, E5®, E7®, E9 ™, Calix Cloud ℠, Compass®, Consumer Connect ℠, Fiber Forward ™ and other trademarks or service marks of Calix appearing in this Annual Report on Form 10-K are the property of Calix. Trade names, trademarks and service marks of other companies appearing in this Annual Report on Form 10-K are the property of the respective holders. Calix is subject to the information and periodic reporting requirements of the Securities Exchange Act of 1934, or Exchange Act, and files periodic reports, proxy statements and other information with the Securities and Exchange Commission, or SEC. Such periodic reports, proxy statements and other information are available for inspection and copying at the SEC's Public Reference Room at 100 F Street, NE., Washington, DC 20549 or may be obtained by calling the SEC at 1-800-SEC-0330. In addition, the SEC maintains a website at www.sec.gov that contains reports, proxy statements and other information regarding issuers that file electronically with the SEC. We post on the Investor Relations page of our website, www.calix.com, a link to our filings with the SEC free of charge, as soon as reasonably practical after they are filed electronically with the SEC.

ITEM 1A. Risk Factors

We have identified the following additional risks and uncertainties that may affect our business, financial condition and/or results of operations. Investors should carefully consider the risks described below, together with the other information set forth in this Annual Report on Form 10-K, before making any investment decision. The risks described below are not the only ones we face. Additional risks not currently known to us or that we currently believe are immaterial may also significantly impair our business operations. Our business could be harmed by any of these risks. The trading price of our common stock could decline due to any of these risks, and investors may lose all or part of their investment.

Risks Related to Our Business and Industry

Our markets are rapidly changing, which makes it difficult to predict our future revenue and plan our expenses appropriately.

We compete in markets characterized by rapid technological change, changing needs of CSPs, evolving industry standards and frequent introductions of new products and services. We invest significant amounts to pursue innovative technologies that we believe would be adopted by CSPs. In addition, on an ongoing basis we expect to reposition our product and service offerings and introduce new products and services as we encounter rapidly changing CSP requirements and increasing competitive pressures. If we cannot keep pace with rapid technological developments to meet our customers' needs and compete with evolving industry standards or if the technologies we choose to invest in fail to meet customer needs or are not adopted by customers, the use of our products and our revenue could decline, making it difficult to forecast our future revenue and plan our operating expenses appropriately.

We have a history of losses, and we may not be able to generate positive operating income and positive cash flows in the future.

We have experienced net losses in each year of our existence. We incurred net losses of $83.0 million in 2017, $27.4 million in 2016 and $26.3 million in 2015. As of December 31, 2017, we had an accumulated deficit of $667.4 million.

We expect to continue to incur significant expenses and cash outlays for research and development associated with the platforms and systems that make up our product portfolio, growth of our cloud and services operations, investments in innovative technologies, expansion of our product portfolio, sales and marketing, customer support and general and administrative functions as we expand our business and operations and target new customer segments, primarily larger CSPs including cable MSOs. Given our growth rate and the intense competitive pressures we face, we may be unable to control our operating costs.

We cannot guarantee that we will achieve profitability in the future. We will have to generate and sustain significant and consistent increased revenue, while continuing to control our expenses, in order to achieve and then maintain profitability. We may also incur significant losses in the future for a number of reasons, including the risks discussed in this "Risk Factors" section and other factors that we cannot anticipate. We have incurred higher than expected costs associated with the growth of our professional services business and, if we are unable to scale that business and attain operational efficiencies, we will continue to incur losses. If we are unable to generate positive operating income and positive cash flows from operations, our liquidity, gross margin, results of operations and financial condition will be adversely affected. If we are unable to generate cash flows to support our operational needs, we may need to seek other sources of liquidity, including additional borrowings, to support our working capital needs. In addition, we may choose to seek other sources of liquidity even if we believe we have generated sufficient cash flows to support our operational needs. There is no assurance that any other sources of liquidity may be available to us on acceptable terms or at all. If we are unable to generate sufficient cash flows or obtain other sources of liquidity, we will be forced to limit our development activities, reduce our investment in growth initiatives and institute cost-cutting measures, all of which would adversely impact our business and growth.

Our quarterly and annual operating results may fluctuate significantly, which may make it difficult to predict our future performance and could cause the market price of our stock to decline.

A number of factors, many of which are outside of our control, may cause or contribute to significant fluctuations in our quarterly and annual operating results. These fluctuations may make financial planning and forecasting difficult. Comparing our operating results on a period-to-period basis may not be meaningful, and you should not rely on our past results as an indication of our future performance. If our revenue or operating results fall below the expectations of investors or securities analysts, or below any guidance we may provide to the market, the market price of our stock would likely decline. Moreover, we may experience delays in recognizing revenue under applicable revenue recognition rules. For example, revenue associated with large turnkey network improvement projects, which include projects that are funded by the CAF program, is generally deferred until customer acceptance is received and may be subject to delays, rework requirements and unexpected costs, among other uncertainties. Certain government-funded contracts, such as those funded by U.S. Department of Agriculture’s RUS, also include acceptance and administrative requirements that delay revenue recognition. The extent of these delays and their impact on our revenue can fluctuate considerably depending on the number and size of purchase orders under these contracts for a given time period. In addition, unanticipated decreases in our available liquidity due to fluctuating operating results could limit our growth and delay implementation of our expansion plans.

In addition to the other risk factors listed in this "Risk Factors" section, factors that have in the past and may continue to contribute to the variability of our operating results include:

- our ability to predict our revenue and reduce and control product costs, including larger scale turnkey network improvement projects that may span several quarters;
- our ability to increase our sales to larger CSPs globally;
- the capital spending patterns of CSPs and any decrease or delay in capital spending by CSPs due to macro-economic conditions, regulatory uncertainties or other reasons;
- the impact of government-sponsored programs on our customers;
- intense competition;
- our ability to develop new products or enhancements that support technological advances and meet changing CSP requirements;
- our ability to achieve market acceptance of our products and CSPs' willingness to deploy our new products;
- the concentration of our customer base as well as our dependence on a limited number of key customers;
- the length and unpredictability of our sales cycles and timing of orders;
- our lack of long-term, committed-volume purchase contracts with our customers;
- our exposure to the credit risks of our customers;
- fluctuations in our gross margin;
- the interoperability of our products with CSP networks;
- our dependence on sole-, single- and limited-source suppliers;
- our ability to manage our relationships with our third-party vendors, including contract manufacturers, ODMs, logistics providers, component suppliers and development partners;
- our ability to forecast our manufacturing requirements and manage our inventory;
- our products' compliance with industry standards;
- our ability to expand our international operations;
- our ability to protect our intellectual property and the cost of doing so;
- the quality of our products, including any undetected hardware defects or bugs in our software;
- our ability to estimate future warranty obligations due to product failure rates;
- our ability to obtain necessary third-party technology licenses at reasonable costs;
- the regulatory and physical impacts of climate change and other natural events;
- the attraction and retention of qualified employees and key management personnel;
- our ability to build and sustain an adequate and secure information technology infrastructure; and
- our ability to maintain proper and effective internal controls.

Our gross margin may fluctuate over time, and our current level of gross margin may not be sustainable.

Our current level of gross margin may not be sustainable and may be adversely affected by numerous factors, including:

- changes in customer, geographic or product mix, including the mix of configurations within each product group;
- the pursuit or addition of new large customers;
- increased price competition, including the impact of customer discounts and rebates;
- our ability to reduce and control product costs;
- an increase in revenue mix toward services, which typically have lower margin;
- changes in component pricing;
- changes in contract manufacturer rates;
- charges incurred due to inventory holding periods if parts ordering does not correctly anticipate product demand;
- introduction of new products and new technologies, which may involve higher component costs;
- our ability to scale our services business in order to gain desired efficiencies;
- changes in shipment volume;
- changes in or increased reliance on distribution channels;

- potential liabilities associated with increased reliance on third-party vendors;
- increased expansion efforts into new or emerging markets;
- increased warranty costs;
- excess and obsolete inventory and inventory holding charges;
- expediting costs incurred to meet customer delivery requirements; and
- potential costs associated with contractual liquidated damages obligations.

An increase in revenue mix towards services will adversely affect our gross margin.

Customers are demanding greater professional and support services for our products, which usually have a lower gross margin than product purchases. In particular, we have experienced increased demand for professional services associated with network improvement projects, which typically are turnkey projects whereby we supply products and related professional services such as network planning, product installation, testing and network turn up. Revenue recognized from such professional services may be delayed because of the timing of completion and acceptance of a project or milestone, including third-party delays that may be outside our control. Additionally, if we are unable to meet project deadlines for professional and support services due to our suppliers' inability to meet our demands for components or for any other reasons, we will incur additional costs, including higher premiums to source necessary components, additional costs and expedited fees to meet project deadlines, all of which would negatively impact our gross margin. We also rely upon third-party subcontractors to assist with some of our services projects, which generally result in higher costs and increased risk of cost overruns, including expenditures for costly rework, which would also negatively impact our gross margin. Furthermore, we incurred ramp up costs to grow our professional service business to meet customer demand, but we may not achieve the desired efficiencies and scale in our professional services business, which will have an adverse impact on our gross margin. Increases in professional services as a proportion of our revenue mix have resulted in lower overall gross margin and may continue to result in lower overall gross margin in future periods. This negative impact on gross margin is exacerbated in periods where we experience accelerated levels of activity to meet project requirements and customer deadlines. Moreover, the increase in our professional services projects has resulted in increased deferred costs, including costs directly associated with the delivery of the professional services for the arrangement, that are recognized as cost of revenue only when all revenue recognition criteria are met for the arrangement. In the event some or all of such deferred costs are deemed unrecoverable, including as a result of cost overruns, we will incur additional charges to cost of revenue in the period such deferred costs are determined to be unrecoverable. Any charge to cost of revenue for deferred costs determined to be unrecoverable would negatively impact our gross margin.

Our business is dependent on the capital spending patterns of CSPs, and any decrease or delay in capital spending by CSPs in response to economic conditions, seasonality, uncertainties associated with the implementation of regulatory reform or otherwise would reduce our revenue and harm our business.

Demand for our products depends on the magnitude and timing of capital spending by CSPs as they construct, expand, upgrade and maintain their access networks. Any future economic downturn may cause a slowdown in telecommunications industry spending, including in the specific geographies and markets in which we operate. In response to reduced consumer spending, challenging capital markets or declining liquidity trends, capital spending for network infrastructure projects of CSPs could be delayed or canceled. In addition, capital spending is cyclical in our industry, sporadic among individual CSPs and can change on short notice. As a result, we may not have visibility into changes in spending behavior until nearly the end of a given quarter.

CSP spending on network construction, maintenance, expansion and upgrades is also affected by reductions in their budgets, delays in their purchasing cycles, access to external capital (such as government grants and loan programs or the capital markets) and seasonality and delays in capital allocation decisions. For example, our CSP customers tend to spend less in the first quarter as they are still finalizing their annual budgets and in certain regions customers are also challenged by winter weather conditions that inhibit outside fiber deployment, resulting in weaker demand for our products in the first quarter of our fiscal year. Also, softness in demand across any of our customer markets, including due to macro-economic conditions beyond our control or uncertainties associated with the implementation of regulatory reform, has in the past and could in the future lead to unexpected slowdown in capital expenditures by service providers.

Many factors affecting our results of operations are beyond our control, particularly in the case of large CSP orders and network infrastructure deployments involving multiple vendors and technologies where the achievement of certain thresholds for acceptance is subject to the readiness and performance of the CSP or other providers and changes in CSP requirements or installation plans. Further, CSPs may not pursue infrastructure upgrades that require our access systems and software. Infrastructure improvements may be delayed or prevented by a variety of factors including cost, regulatory obstacles (including uncertainties associated with the implementation of regulatory reforms), mergers, lack of consumer demand for advanced communications services and alternative approaches to service delivery. Reductions in capital expenditures by CSPs, particularly CSPs that are significant customers, may have a material negative impact on our revenue and results of operations and slow our rate of revenue growth. As a consequence, our results for a particular period may be difficult to predict, and our prior results are not necessarily indicative of results in future periods.

Government-sponsored programs could impact the timing and buying patterns of CSPs, which may cause fluctuations in our operating results.

We sell to CSPs, which include U.S.-based IOCs, which have revenue that is particularly dependent upon interstate and intrastate access charges and federal and state subsidies. The Federal Communications Commission, or FCC, and some states may consider changes to such payments and subsidies, and these changes could reduce IOC revenue. Furthermore, many IOCs use or expect to use government-supported loan programs or grants, such as RUS loans and grants, to finance capital spending. Changes to these programs, including uncertainty from government and administrative change, could reduce the ability of IOCs to access capital and thus reduce our revenue opportunities.

Many of our customers were awarded grants or loans under government stimulus programs such as the Broadband Stimulus programs under the American Recovery and Reinvestment Act of 2009, or ARRA, and the funds distributed under the FCC's CAF program, and have purchased and will continue to purchase products from us or other suppliers while such programs and funding are available. However, customers may substantially curtail purchases as funding winds down or as planned purchases are completed.

In addition, any changes in government regulations and subsidies could cause our customers to change their purchasing decisions, which could have an adverse effect on our operating results and financial condition.

We face intense competition that could reduce our revenue and adversely affect our financial results.

The market for our products is highly competitive, and we expect competition from both established and new companies to increase. Our competitors include companies such as ADTRAN, Arris Group, Inc., Ciena Corporation, Cisco Systems Inc., Huawei Technologies Co. Ltd., Juniper Networks Inc., Nokia Corporation, ZTE Corporation and DASAN Zhone Solutions, Inc., among others.

Our ability to compete successfully depends on a number of factors, including:

- the successful development of new products;
- our ability to anticipate CSP and market requirements and changes in technology and industry standards;
- our ability to differentiate our products from our competitors' offerings based on performance, cost-effectiveness or other factors;
- our ongoing ability to successfully integrate acquired product lines and customer bases into our business;
- our ability to meet increased customer demand for professional services associated with network improvement projects;
- our ability to gain customer acceptance of our products; and
- our ability to market and sell our products.

The broadband access equipment market has undergone and continues to undergo consolidation, as participants have merged, made acquisitions or entered into partnerships or other strategic relationships with one another to offer more comprehensive solutions than they individually had offered. Recent examples include Arris' acquisition of Pace plc in January 2016; Nokia's acquisition of Alcatel-Lucent in January 2016; and the merger of DASAN Zhone Solutions with DASAN Network Solutions in September 2016. We expect this trend to continue as companies attempt to strengthen or maintain their market positions in an evolving industry.

Many of our current or potential competitors have longer operating histories, greater name recognition, larger customer bases and significantly greater financial, technical, sales, marketing and other resources than we do and are better positioned to acquire and offer complementary products and services. Many of our competitors have broader product lines and can offer bundled solutions, which may appeal to certain customers. Our competitors may also invest additional resources in developing more compelling product offerings. Potential customers may also prefer to purchase from their existing suppliers rather than a new supplier, regardless of product performance or features, because the products that we and our competitors offer require a substantial investment of time and funds to qualify and install.

Some of our competitors may offer substantial discounts or rebates to win new customers or to retain existing customers. If we are forced to reduce prices in order to secure customers, we may be unable to sustain gross margin at desired levels or achieve profitability. Competitive pressures could result in increased pricing pressure, reduced profit margin, increased sales and marketing expenses and failure to increase, or the loss of, market share, any of which could reduce our revenue and adversely affect our financial results.

Product development is costly, and if we fail to develop new products or enhancements that meet changing CSP requirements, we could experience lower sales.

Our industry is characterized by rapid technological advances, frequent new product introductions, evolving industry standards and unanticipated changes in subscriber requirements. Our future success will depend significantly on our ability to anticipate and adapt to such changes, and to offer, on a timely and cost-effective basis, products and features that meet changing CSP demands and industry standards. We intend to continue making significant investments in developing new products and enhancing the functionality of our existing products. Developing our products is expensive and complex and involves uncertainties. We may not have sufficient resources to successfully manage lengthy product development cycles. Our research and development expenses were $127.5 million, or 25% of our revenue, in 2017, $106.9 million, or 23% of our revenue, in 2016 and $89.7 million, or 22% of our revenue, in 2015. We believe that we must continue to dedicate a significant amount of resources to our research and development efforts, including increased reliance on third-party development partners, to maintain our competitive position. These investments may take several years to generate positive returns, if ever. In addition, we may experience design, manufacturing, marketing and other difficulties that could delay or prevent the development, introduction or marketing of new products and enhancements. If we fail to meet our development targets, demand for our products will decline.

In addition, the introduction of new or enhanced products also requires that we manage the transition from older products to these new or enhanced products in order to minimize disruption in customer ordering patterns, fulfill ongoing customer commitments and ensure that adequate supplies of new products are available for delivery to meet anticipated customer demand. If we fail to maintain compatibility with other software or equipment found in our customers' existing and planned networks, we may face substantially reduced demand for our products, which would reduce our revenue opportunities and market share. Moreover, as customers complete infrastructure deployments, they may require greater levels of service and support than we have provided in the past. We may not be able to provide products, services and support to compete effectively for these market opportunities. If we are unable to anticipate and develop new products or enhancements to our existing products on a timely and cost-effective basis, we could experience lower sales, which would harm our business.

Our new products are early in their life cycles and subject to uncertain market demand. If our customers are unwilling to install our new products or deploy our new services, or we are unable to achieve market acceptance of our new products, our business and financial results will be harmed.

Our new products are early in their life cycles and subject to uncertain market demand. They also may face obstacles in manufacturing, deployment and competitive response. Potential customers may choose not to invest the additional capital required for initial system deployment of new products. In addition, demand for new products is dependent on the success of our customers in deploying and selling advanced services to their subscribers. Our products support a variety of advanced broadband services, such as high-speed Internet, Internet protocol television, mobile broadband, high-definition video and online gaming. If subscriber demand for such services does not grow as expected or declines or our customers are unable or unwilling to deploy and market these services, demand for our products may decrease or fail to grow at rates we anticipate.

Our customer base is concentrated, and there are a limited number of potential customers for our products. The loss of any of our key customers, a decrease in purchases by our key customers or our inability to grow our customer base would adversely impact our revenue and results of operations and any delays in payment by a key customer could negatively impact our cash flows and working capital.

Historically, a large portion of our sales has been to a limited number of customers. For example, one customer accounted for 31% of our revenue in 2017, 21% of our revenue in 2016 and 22% of our revenue in 2015, and another customer accounted for 15% of our revenue in 2016. However, we cannot anticipate the level of purchases in the future by these customers. Customer purchases may be delayed or impacted due to financial difficulties, spending cuts or corporate consolidations. For example, one of our key customers recently completed a large acquisition, which continues to disrupt its normal expenditure plans, including continued delays and reduction in purchases of our products and services as it finalizes its transition activities and corporate strategies. Any decrease or delay in purchases and/or capital expenditure plans of any of our key customers, or our inability to grow our sales with existing customers, may have a material negative impact on our revenue and results of operations.

We anticipate that a large portion of our revenue will continue to depend on sales to a limited number of customers. In addition, some larger customers may demand discounts and rebates or desire to purchase their access systems and software from multiple providers. As a result of these factors, our future revenue opportunities may be limited, our margins could be reduced and our profitability may be adversely impacted. The loss of, or reduction in, orders from any key customer would significantly reduce our revenue and harm our business. Furthermore, delays in payment and/or extended payment terms from any of our key or larger customers could have a material negative impact on our cash flows and working capital to support our business operations.

Furthermore, in recent years, the CSP market has undergone substantial consolidation. Industry consolidation generally has negative implications for equipment suppliers, including a reduction in the number of potential customers, a decrease in aggregate capital spending and greater pricing leverage on the part of CSPs over equipment suppliers. Continued consolidation of the CSP industry and among ILEC and IOC customers, who represent a large part of our business, could make it more difficult for us to grow our customer base, increase sales of our products and maintain adequate gross margin.

Our sales cycles can be long and unpredictable, and our sales efforts require considerable time and expense. As a result, our sales are difficult to predict and may vary substantially from quarter to quarter, which may cause our operating results to fluctuate significantly.

The timing of our revenue is difficult to predict. Our sales efforts often involve educating CSPs about the use and benefits of our products. CSPs typically undertake a significant evaluation process, which frequently involves not only our products but also those of our competitors and results in a lengthy sales cycle. Sales cycles for larger customers are relatively longer and require considerably more time and expense. We spend substantial time, effort and money in our sales efforts without any assurance that our efforts will produce sales. In addition, product purchases are frequently subject to budget constraints, multiple approvals and unplanned administrative, processing and other delays. The timing of revenue related to sales of products and services that have installation requirements may be difficult to predict due to interdependencies that may be beyond our control, such as CSP testing and turn-up protocols or other vendors' products, services or installations of equipment upon which our products and services rely. In addition, larger projects may have longer periods between project commencement and completion and recognition of revenue. Such delays may result in fluctuations in our quarterly revenue. If sales expected from a specific customer for a particular quarter are not realized in that quarter or at all, we may not achieve our revenue forecasts and our financial results would be adversely affected.

Our focus on CSPs with relatively small networks limits our revenue from sales to any one customer and makes our future operating results difficult to predict.

A large portion of our sales efforts continue to be focused on CSPs with relatively small networks, cable MSOs and selected international CSPs. Our current and potential customers generally operate small networks with limited capital expenditure budgets. Accordingly, we believe the potential revenue from the sale of our products to any one of these customers is limited. As a result, we must identify and sell products to new customers each quarter to continue to increase our sales. In addition, the spending patterns of many of our customers are characterized by small and sporadic purchases. As a consequence, we have limited backlog and will likely continue to have limited visibility into future operating results.

We do not have long-term, committed-volume purchase contracts with our customers, and therefore have no guarantee of future revenue from any customer.

We typically have not entered into long-term, committed-volume purchase contracts with our customers, including our key customers which account for a material portion of our revenue. As a result, any of our customers may cease to purchase our products at any time. In addition, our customers may attempt to renegotiate terms of sale, including price and quantity. If any of our key customers stop purchasing our access platforms, systems and software for any reason, our business and results of operations would be harmed.

Our efforts to increase our sales to CSPs globally, including cable MSOs, may be unsuccessful.

Our sales and marketing efforts have been focused on CSPs in North America. Part of our long-term strategy is to increase sales to CSPs globally, including cable MSOs. We have devoted and continue to devote substantial technical, marketing and sales resources to the pursuit of these larger CSPs, who have lengthy equipment qualification and sales cycles, without any assurance of generating sales. In particular, sales to these larger CSPs may require us to upgrade our products to meet more stringent performance criteria and interoperability requirements, develop new customer-specific features or adapt our product to meet international standards. For example, we have been engaged by a large CSP in testing and laboratory trials for our NG-PON2 technology along with our partner Ericsson. We have invested and expect to continue to invest considerable time, effort and expenditures, including investment in product research and development, related to this opportunity without any assurance that our efforts will produce orders or revenue. If we are unable to successfully increase our sales to larger CSPs, our operating results, financial condition, cash flows and long-term growth may be negatively impacted.

We are exposed to the credit risks of our customers; if we have inadequately assessed their creditworthiness, we may have more exposure to accounts receivable risk than we anticipate. Failure to collect our accounts receivable in amounts that we anticipate could adversely affect our operating results and financial condition.

In the course of our sales to customers, we may encounter difficulty collecting accounts receivable and could be exposed to risks associated with uncollectible accounts receivable. We maintain an allowance for doubtful accounts for estimated losses resulting from the inability or unwillingness of our customers to make required payments. However, these allowances are based on our judgment and a variety of factors and assumptions.

We perform credit evaluations of our customers' financial condition. However, our evaluation of the creditworthiness of customers may not be accurate if they do not provide us with timely and accurate financial information or if their situations change after we evaluate their credit. While we attempt to monitor these situations carefully, adjust our allowances for doubtful accounts as appropriate and take measures to collect accounts receivable balances, we have written down accounts receivable and written off doubtful accounts in prior periods and may be unable to avoid additional write-downs or write-offs of doubtful accounts in the future. Such write-downs or write-offs could negatively affect our operating results for the period in which they occur, and could harm our financial condition.

Our products must interoperate with many software applications and hardware products found in our customers' networks. If we are unable to ensure that our products interoperate properly, our business will be harmed.

Our products must interoperate with our customers' existing and planned networks, which often have varied and complex specifications, utilize multiple protocol standards, include software applications and products from multiple vendors and contain multiple generations of products that have been added over time. As a result, we must continually ensure that our products interoperate properly with these existing and planned networks. To meet these requirements, we must undertake development efforts that require substantial capital investment and employee resources. We may not accomplish these development goals quickly or cost-effectively, if at all. If we fail to maintain compatibility with other software or equipment found in our customers' existing and planned networks, we may face substantially reduced demand for our products, which would reduce our revenue opportunities and market share.

We have entered into interoperability arrangements with a number of equipment and software vendors for the use or integration of their technology with our products. These arrangements give us access to and enable interoperability with various products that we do not otherwise offer. If these relationships fail, we may have to devote substantially more resources to the development of alternative products and processes and our efforts may not be as effective as the combined solutions under our current arrangements. In some cases, these other vendors are either companies that we compete with directly or companies that have extensive relationships with our existing and potential customers and may have influence over the purchasing decisions of those customers. Some of our competitors have stronger relationships with some of our existing and other potential interoperability partners, and as a result, our ability to have successful interoperability arrangements with these companies may be harmed. Our failure to establish or maintain key relationships with third-party equipment and software vendors may harm our ability to successfully sell and market our products.

The quality of our support and services offerings is important to our customers, and if we fail to continue to offer high quality support and services, we could lose customers, which would harm our business.

Once our products are deployed within our customers' networks, they depend on our support organization to resolve any issues relating to those products. A high level of support is critical for the successful marketing and sale of our products. Furthermore, our services to customers have increasingly broadened to include network design and services to deploy our products within our customers' networks, such as our professional services associated with turnkey network improvement projects for our customers. If we do not effectively assist our customers in deploying our products, succeed in helping them quickly resolve post-deployment issues or provide effective ongoing support, it could adversely affect our ability to sell our products to existing customers and harm our reputation with potential new customers. As a result, our failure to maintain high quality support and services could result in the loss of customers, which would harm our business.

Our products are highly technical and may contain undetected hardware defects or software bugs, which could harm our reputation and adversely affect our business.

Our products are highly technical and, when deployed, are critical to the operation of many networks. Our products have contained and may contain undetected defects, bugs or security vulnerabilities. Some defects in our products may only be discovered after a product has been installed and used by customers and may in some cases only be detected under certain circumstances or after extended use. Any errors, bugs, defects or security vulnerabilities discovered in our products after commercial release could result in loss of revenue or delay in revenue recognition, loss of customers and increased service and warranty and retrofit costs, any of which could adversely affect our business, operating results and financial condition. In addition, we could face claims for product liability, tort or breach of warranty. Our contracts with customers contain provisions relating to warranty disclaimers and liability limitations, which may not be upheld. Defending a lawsuit, regardless of its merit, is costly and may divert management's attention and adversely affect the market's perception of us and our products. In addition, if our business liability insurance coverage proves inadequate or future coverage is unavailable on acceptable terms or at all, our business, operating results and financial condition could be adversely impacted.

Our estimates regarding future warranty or product obligations may change due to product failure rates, shipment volumes, field service obligations and rework costs incurred in correcting product failures. If our estimates change, the liability for warranty or product obligations may be increased, impacting future cost of revenue.

Our products are highly complex, and our product development, manufacturing and integration testing may not be adequate to detect all defects, errors, failures and quality issues. Quality or performance problems for products covered under warranty could adversely impact our reputation and negatively affect our operating results and financial position. The development and production of new products with high complexity often involves problems with software, components and manufacturing methods. If significant warranty or other product obligations arise due to reliability or quality issues arising from defects in software, faulty components or improper manufacturing methods, our operating results and financial position could be negatively impacted by:

- cost associated with fixing software or hardware defects;
- high service and warranty expenses;
- high inventory obsolescence expense;
- delays in collecting accounts receivable;
- payment of liquidated damages for performance failures; and
- declining sales to existing customers.

We do not have manufacturing capabilities, and therefore we depend upon a small number of outside contract manufacturers and ODMs. We do not have supply contracts with all of these contract manufacturers and ODMs; consequently, our operations could be disrupted if we encounter problems with any of these contract manufacturers or ODMs.

We do not have internal manufacturing capabilities and rely upon a small number of contract manufacturers and ODMs to build our products. In particular, we rely on Flex for the manufacture of most of our products. Our reliance on a small number of contract manufacturers and ODMs makes us vulnerable to possible capacity constraints and reduced control over component availability, delivery schedules, manufacturing yields and costs.

We do not have supply contracts with some of our contract manufacturers and ODMs. Consequently, these contract manufacturers are not obligated to supply products to us for any specific period, in any specific quantity or at any certain price. In addition, we are dependent upon our contract manufacturers' and ODMs' quality systems and controls and the adherence of such systems and controls to applicable standards. If our contract manufacturers and ODMs fail to maintain levels of quality manufacture suitable for us or our customers, we may incur higher costs and our relationships with our customers may be harmed.

The revenue that Flex and other contract manufacturers generate from our orders represent a relatively small percentage of those manufacturers' overall revenue. As a result, fulfilling our orders may not be considered a priority if such manufacturers are constrained in their ability to fulfill all of their customer obligations in a timely manner. In addition, a substantial part of our manufacturing is done in our contract manufacturer and ODM facilities that are located outside of the United States, including Flex's facilities. We believe that the location of these facilities outside of the United States increases supply risk, including the risk of supply interruptions or reductions in manufacturing quality or controls. Moreover, regulatory changes or government actions relating to export or import regulations, economic sanctions or related legislation, or the possibility of such changes or actions, may create uncertainty or result in changes to or disruption in our operations with our contract manufacturers.

If Flex or any of our other contract manufacturers or ODMs were unable or unwilling to continue manufacturing our products in required volumes and at high quality levels, we would have to identify, qualify and select acceptable alternative contract manufacturers. An alternative contract manufacturer may not be available to us when needed or may not be in a position to satisfy our production requirements at commercially reasonable prices and quality. Any significant interruption in manufacturing would require us to reduce our supply of products to our customers, which in turn would reduce our revenue and harm our relationships with our customers.

We and our business partners, including our contract manufacturers and suppliers, depend on sole-source, single-source and limited-source suppliers for some key components. If we and our business partners are unable to source these components on a timely basis, we will not be able to deliver our products to our customers.

We and our business partners, including our contract manufacturers and suppliers, depend on sole-source, single-source and limited-source suppliers for some key components of our products. For example, certain of our application-specific integrated circuit processors and resistor networks are purchased from sole-source suppliers.

Any of the sole-source, single-source and limited-source suppliers upon whom we or our business partners rely could stop producing our components, cease operations, or enter into exclusive arrangements with our competitors. We may also experience shortages or delay of critical components as a result of growing demand in the industry or other sectors. For example, growth in electronic and IoT devices, wireless products, automotive electronics and artificial intelligence all drive increased demand for certain components, such as chipsets and memory products, which may result in lower availability and increased prices for such components.

In addition, purchase volumes of such components may be too low for Calix to be considered a priority customer by these suppliers. As a result, these suppliers could stop selling to us and our business partners at commercially reasonable prices, or at all. Any such interruption or delay may force us and our business partners to seek similar components from alternative sources, which may not be available. Switching suppliers could also require that we redesign our products to accommodate new components and could require us to re-qualify our products with our customers, which would be costly and time-consuming. Any interruption in the supply of sole-source, single-source or limited-source components for our products would adversely affect our ability to meet scheduled product deliveries to our customers, could result in lost revenue or higher expenses and would harm our business.

We utilize domestic and international third-party vendors to assist in the design, development and manufacture of certain of our products, and to provide logistics services in the distribution of our products. If these vendors fail to provide these services, we could incur additional costs and delays or lose revenue.

From time to time we enter into ODM, original equipment manufacturer, or OEM, and development agreements for the design, development and/or manufacture of certain of our products in order to enable us to offer products on an accelerated basis. For example, a third party assisted in the design and currently manufactures portions of our E-Series systems and nodes family. We also rely upon limited third party vendors for logistics services to distribute our products. If any of these third-party vendors stop providing their services, for any reason, we would have to obtain similar services from alternative sources, which may not be available on commercially reasonable terms, if at all. We also have limited control over disruptions that may occur at the facilities of these third-party partners, such as supply interruptions or manufacturing quality that may occur at ODM and OEM facilities and strikes or systems failures that may interrupt transportation and logistics services. In addition, switching development firms or manufacturers could require us to extend our development timeline and/or re-qualify our products with our customers, which would also be costly and time-consuming. Any interruption in the development, supply or distribution of our products would adversely affect our ability to meet scheduled product deliveries to our customers and could result in lost revenue or higher costs, which would negatively impact our margins and operating results and harm our business.

If we fail to forecast our manufacturing requirements accurately or fail to properly manage our inventory with our contract manufacturers, we could incur additional costs, experience manufacturing delays and lose revenue.

We bear inventory risk under our contract manufacturing arrangements and our ODM and OEM agreements. Lead times for the materials and components that we order through our manufacturers vary significantly and depend on numerous factors, including the specific supplier, contract terms and market demand for a component at a given time. Lead times for certain key materials and components incorporated into our products are currently lengthy, requiring our manufacturers to order materials and components several months in advance of manufacture.

If we overestimate our production requirements, our manufacturers may purchase excess components and build excess inventory. If our manufacturers, at our request, purchase excess components that are unique to our products or build excess products, we could be required to pay for these excess parts or products and their storage costs. Historically, we have reimbursed our primary contract manufacturers for a portion of inventory purchases when our inventory has been rendered excess or obsolete. Examples of when inventory may be rendered excess or obsolete include manufacturing and engineering change orders resulting from design changes or in cases where inventory levels greatly exceed projected demand. If we incur payments to our manufacturers associated with excess or obsolete inventory, this may have an adverse effect on our gross margin, financial condition and results of operations.

We have experienced unanticipated increases in demand from customers, which resulted in delayed shipments and variable shipping patterns. If we underestimate our product requirements, our manufacturers may have inadequate component inventory, which could interrupt manufacturing of our products, increase our cost of product revenue associated with expedite fees and air freight and/or result in delays or cancellation of sales.

As the market for our products evolves, changing customer requirements may adversely affect the valuation of our inventory.

Customer demand for our products can change rapidly in response to market and technology developments. Demand can be affected not only by customer- or market-specific issues, but also by broader economic and/or geopolitical factors. We may, from time to time, adjust inventory valuations downward in response to our assessment of demand from our customers for specific products or product lines. The related excess inventory charges may have an adverse effect on our gross margin, financial condition and results of operations.

If we fail to comply with evolving industry standards, sales of our existing and future products would be adversely affected.

The markets for our products are characterized by a significant number of standards, both domestic and international, which are evolving as new technologies are developed and deployed. As we expand into adjacent markets and increase our international footprint, we are likely to encounter additional standards. Our products must comply with these standards in order to be widely marketable. In some cases, we are compelled to obtain certifications or authorizations before our products can be introduced, marketed or sold in new markets or to customers that we have not historically served. For example, our ability to maintain Operations System Modification for Intelligent Network Elements certification for our products will affect our ongoing ability to continue to sell our products to Tier 1 CSPs. In addition, our ability to expand our international operations and create international market demand for our products may be limited by regulations or standards adopted by other countries that may require us to redesign our existing products or develop new products suitable for sale in those countries. Although we believe our products are currently in compliance with domestic and international standards and regulations in countries in which we currently sell, we may not be able to design our products to comply with evolving standards and regulations in the future. This ongoing evolution of standards may directly affect our ability to market or sell our products. Further, the cost of complying with the evolving standards and regulations or the failure to obtain timely domestic or foreign regulatory approvals or certifications could prevent us from selling our products where these standards or regulations apply, which would result in lower revenue and lost market share.

We may be unable to successfully expand our international operations. In addition, we may be subject to a variety of international risks that could harm our business.

We currently generate most of our sales from customers in North America and have limited experience marketing, selling and supporting our products and services outside North America or managing the administrative aspects of a worldwide operation. Our ability to expand our international operations is dependent on our ability to create or maintain international market demand for our products. In addition, as we expand our operations internationally, our support organization will face additional challenges including those associated with delivering support, training and documentation in languages other than English. If we invest substantial time and resources to expand our international operations and are unable to do so successfully and in a timely manner, our business, financial condition and results of operations may suffer.

In the course of expanding our international operations and operating overseas, we will be subject to a variety of risks, including:

- differing regulatory requirements, including tax laws, trade laws, data privacy laws, labor regulations, tariffs, export quotas, custom duties or other trade restrictions;
- liability or damage to our reputation resulting from corruption or unethical business practices in some countries;
- exposure to effects of fluctuations in currency exchange rates if, over time, international customer contracts are increasingly denominated in local currencies;
- longer collection periods and difficulties in collecting accounts receivable;
- greater difficulty supporting and localizing our products;
- different or unique competitive pressures as a result of, among other things, the presence of local equipment suppliers;
- challenges inherent in efficiently managing an increased number of employees over large geographic distances, including the need to implement appropriate systems, policies and compensation, benefits and compliance programs;
- limited or unfavorable intellectual property protection;
- risk of change in international political or economic conditions, terrorist attacks or acts of war; and
- restrictions on the repatriation of earnings.

We engage resellers to promote, sell, install and support our products to some customers in North America and internationally. Their failure to do so or our inability to recruit or retain appropriate resellers may reduce our sales and thus harm our business.

We engage some value added resellers, or VARs, who provide sales and support services for our products. In particular, the non-exclusive reseller agreement entered into with Ericsson in 2012 has provided us with an extensive global reseller channel. More recently we have partnered with Ericsson on larger customer opportunities. We compete with other telecommunications systems providers for our VARs' business and many of our VARs, including Ericsson, are free to market competing products. Our use of VARs and other third-party support partners and the associated risks of doing so are likely to increase as we expand sales outside of North America. If Ericsson or any other VAR promotes a competitor's products to the detriment of our products or otherwise fails to market our products and services effectively, we could lose market share. In addition, the loss of a key VAR or the failure of VARs to provide adequate customer service could have a negative effect on customer satisfaction and could cause harm to our business. If we do not properly recruit and train VARs to sell, install and service our products, our business, financial condition and results of operations may suffer.

The results of the United Kingdom's referendum on withdrawal from the European Union may have a negative effect on global economic conditions, financial markets and our business.

In June 2016, a majority of voters in the United Kingdom elected to withdraw from the European Union in a national referendum. The referendum was advisory, and the terms of any withdrawal are subject to a negotiation period that could last at least two years after the government of the United Kingdom formally initiated the withdrawal process in March 2017. Nevertheless, the referendum has created significant uncertainty about the future relationship between the United Kingdom and the European Union, including with respect to the laws and regulations that will apply as the United Kingdom determines which European Union laws to replace or replicate in the event of a withdrawal. The referendum has also given rise to calls for the governments of other European Union member states to consider withdrawal. These developments, or the perception that any of them could occur, have had and may continue to have a material adverse effect on global economic conditions and the stability of global financial markets, and may significantly reduce global market liquidity and restrict the ability of key market participants to operate in certain financial markets. Any of these factors could depress economic activity and restrict our access to capital, or the access to capital of our customers or partners, which could have a material adverse effect on our operations in the United Kingdom, and generally on our business, financial condition and results of operations and reduce the price of our securities.

We may have difficulty evolving and scaling our business and operations to meet customer and market demand, which could result in lower profitability or cause us to fail to execute on our business strategies.

In order to grow our business, we will need to continually evolve and scale our business and operations to meet customer and market demand. Evolving and scaling our business and operations places increased demands on our management as well as our financial and operational resources to effectively:

- manage organizational change;
- manage a larger organization;
- accelerate and/or refocus research and development activities;
- expand our manufacturing, supply chain and distribution capacity;
- increase our sales and marketing efforts;
- broaden our customer-support and services capabilities;
- maintain or increase operational efficiencies;
- scale support operations in a cost-effective manner;
- implement appropriate operational and financial systems; and
- maintain effective financial disclosure controls and procedures.

If we cannot evolve and scale our business and operations effectively, we may not be able to execute our business strategies in a cost-effective manner and our business, financial condition, profitability and results of operations could be adversely affected.

We may not be able to protect our intellectual property, which could impair our ability to compete effectively.

We depend on certain proprietary technology for our success and ability to compete. We rely on intellectual property laws as well as nondisclosure agreements, licensing arrangements and confidentiality provisions to establish and protect our proprietary rights. U.S. patent, copyright and trade secret laws afford us only limited protection and the laws of some foreign countries do not protect proprietary rights to the same extent. Our pending patent applications may not result in issued patents, and our issued patents may not be enforceable. Any infringement of our proprietary rights could result in significant litigation costs. Further, any failure by us to adequately protect our proprietary rights could result in our competitors offering similar products, resulting in the loss of our competitive advantage and decreased sales.

Despite our efforts to protect our proprietary rights, attempts may be made to copy or reverse engineer aspects of our products or to obtain and use information that we regard as proprietary. Accordingly, we may be unable to protect our proprietary rights against unauthorized third-party copying or use. Furthermore, policing the unauthorized use of our intellectual property is difficult and costly. Litigation may be necessary in the future to enforce our intellectual property rights, to protect our trade secrets or to determine the validity and scope of the proprietary rights of others. Litigation could result in substantial costs, diversion of resources and harm to our business.

We could become subject to litigation regarding intellectual property rights that could harm our business.

We may be subject to intellectual property infringement claims that are costly to defend and could limit our ability to use some technologies in the future. Third parties may assert patent, copyright, trademark or other intellectual property rights to technologies or rights that are important to our business. Such claims may originate from non-practicing entities, patent holding companies or other adverse patent owners who have no relevant product revenue, and therefore, our own issued and pending patents may provide little or no deterrence to suit from these entities.

We have received in the past and expect that in the future we may receive communications from competitors and other companies alleging that we may be infringing their patents, trade secrets or other intellectual property rights; offering licenses to such intellectual property; threatening litigation or requiring us to act as a third-party witness in litigation. In addition, we have agreed, and may in the future agree, to indemnify our customers for expenses or liabilities resulting from certain claimed infringements of patents, trademarks or copyrights of third parties. Such indemnification may require us to be financially responsible for claims made against our customers, including costs of litigation and damages awarded, which could negatively impact our results of operations. Any claims asserting that our products infringe the proprietary rights of third parties, with or without merit, could be time-consuming, result in costly litigation and divert the efforts of our engineering teams and management. These claims could also result in product shipment delays or require us to modify our products or enter into royalty or licensing agreements. Such

royalty or licensing agreements, if required, may not be available to us on acceptable terms, if at all.
Our use of open source software could impose limitations on our ability to commercialize our products.
We incorporate open source software into our products. Although we closely monitor our use of open source software, the terms of many open source software licenses have not been interpreted by the 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 sell our products. In such event, we could be required to make our proprietary software generally available to third parties, including competitors, at no cost, 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 or at all, any of which could adversely affect our revenue and operating expenses.

If we are unable to obtain necessary third-party technology licenses, our ability to develop new products or product enhancements may be impaired.

While our current licenses of third-party technology generally relate to commercially available off-the-shelf technology, we may from time to time be required to license additional technology from third parties to develop new products or product enhancements. These third-party licenses may be unavailable to us on commercially reasonable terms, if at all. Our inability to obtain necessary third-party licenses may force us to obtain substitute technology of lower quality or performance standards or at greater cost, or may increase the time-to-market of our products or product enhancements, any of which could harm the competitiveness of our products and result in lost revenue.

Our ability to incur debt and the use of our funds could be limited by borrowing base restrictions and restrictive covenants in our loan and security agreement for our revolving credit facility.

The Loan and Security Agreement, or the Loan Agreement, we entered into in August 2017 with Silicon Valley Bank, or SVB, provides for a revolving credit facility based on a customary accounts receivable borrowing base, subject to certain exceptions and exclusions, such that borrowings available to us are limited by eligible accounts receivable (as defined in the Loan Agreement). If our financial position deteriorates, our borrowing capacity under the credit facility may be reduced. In addition, the Loan Agreement includes affirmative and negative covenants and requires that we maintain a specified minimum liquidity ratio and maintenance of Adjusted EBITDA (as defined in the Loan Agreement). The negative covenants also include, among others, restrictions on our and our subsidiaries' transferring collateral, making changes to the nature of our business or the business of the applicable subsidiary, incurring additional indebtedness, engaging in mergers or acquisitions, paying dividends or making other distributions, making investments, engaging in transactions with affiliates, making payments in respect of subordinated debt, creating liens and selling assets, in each case subject to certain exceptions. Failure to maintain these restrictive covenants and requirements can limit the amount of borrowings that are available to us, increase the cost of borrowings under the facility, and/or require us to make immediate payments to reduce borrowings. For the month ended November 30, 2017, we were not able to maintain the minimum Adjusted Quick Ratio (as defined in the Loan Agreement) at the level required in the Loan Agreement, which constituted an event of default. Although SVB waived this event of default effective as of November 30, 2017 and, therefore, this default did not terminate our ability to borrow under the Loan Agreement, we were required to pay an amendment fee and amend certain covenants under the Loan Agreement and, in February 2018, we entered into an amendment to the Loan Agreement that, among other things, amended certain affirmative financial covenants, including reductions to the required minimum level of the Adjusted Quick Ratio (as defined in the Loan Agreement) and the inclusion of an additional financial covenant related to the maintenance of Adjusted EBITDA (as defined in the Loan Agreement). Events beyond our control could have a material adverse impact on our results of operations, financial condition or liquidity, in which case we may not be able to meet our financial covenants. The Loan Agreement covenants may also affect our ability to obtain future financing and to pursue attractive business opportunities and our flexibility in planning for, and reacting to, changes in business conditions. These covenants could place us at a disadvantage compared to some of our competitors, who may have fewer restrictive covenants and may not be required to operate under these restrictions.

Our failure or the failure of our manufacturers to comply with environmental and other legal regulations could adversely impact our results of operations.

The manufacture, assembly and testing of our products may require the use of hazardous materials that are subject to environmental, health and safety regulations, or materials subject to laws restricting the use of conflict minerals. Our failure or the failure of our contract manufacturers, ODMs and OEMs to comply with any of these requirements could result in regulatory penalties, legal claims or disruption of production. In addition, our failure or the failure of our manufacturers to properly manage the use, transportation, emission, discharge, storage, recycling or disposal of hazardous materials could subject us to increased costs or liabilities. Existing and future environmental regulations and other legal requirements may restrict our use of certain materials to manufacture, assemble and test products. Any of these consequences could adversely impact our results of operations by increasing our expenses and/or requiring us to alter our manufacturing processes.

Regulatory and physical impacts of climate change and other natural events may affect our customers and our contract manufacturers, resulting in adverse effects on our operating results.

As emissions of greenhouse gases continue to alter the composition of the atmosphere, affecting large-scale weather patterns and the global climate, any new regulation of greenhouse gas emissions may result in additional costs to our customers and our contract manufacturers. In addition, the physical impacts of climate change and other natural events, including changes in weather patterns, drought, rising ocean and temperature levels, earthquakes and tsunamis, may impact our customers, suppliers and contract manufacturers, and our operations. These potential physical effects may adversely affect our revenue, costs, production and delivery schedules, and cause harm to our results of operations and financial condition.

We have in the past pursued, and may in the future continue to pursue, acquisitions which involve a number of risks and uncertainties. If we are unable to address and resolve these risks and uncertainties successfully, such acquisitions could disrupt our business and result in higher costs than we anticipate.

We acquired Occam in 2011 and Ericsson's fiber access assets in 2012. We may in the future acquire other businesses, products or technologies to expand our product offerings and capabilities, customer base and business. We have evaluated and expect to continue to evaluate a wide array of potential strategic transactions. We have limited experience making such acquisitions or integrating these businesses after such acquisitions. Unanticipated costs to us from these historical transactions as well as both anticipated and unanticipated costs to us related to any future transactions could exceed amounts that are covered by insurance and could have a material adverse impact on our financial condition and results of operations. For example, the Occam acquisition resulted in litigation with defense costs that were in excess of available directors' and officers' liability insurance coverage, including costs for which coverage was denied by our insurance carriers. In addition, the anticipated benefit of any acquisitions may never materialize or the process of integrating acquired businesses, products or technologies may create unforeseen operating difficulties and expenditures.

Some of the areas where we have experienced and may in the future experience acquisition-related risks include:

- expenses and distractions, including diversion of management time related to litigation;
- expenses and distractions related to potential claims resulting from any possible future acquisitions, whether or not they are completed;
- retaining and integrating employees from acquired businesses;
- issuance of dilutive equity securities or incurrence of debt;
- integrating various accounting, management, information, human resource and other systems to permit effective management;
- incurring possible write-offs, impairment charges, contingent liabilities, amortization expense of intangible assets or impairment of goodwill and intangible assets with finite useful lives;
- difficulties integrating and supporting acquired products or technologies;
- unexpected capital expenditure requirements;
- insufficient revenue to offset increased expenses associated with acquisitions; and
- opportunity costs associated with committing capital to such acquisitions.

If our goodwill becomes impaired, we may be required to record a significant charge to our results of operations. We review our goodwill for impairment annually or when events or changes in circumstances indicate the carrying value may not be recoverable, such as a sustained or significant decline in stock price and market capitalization. If the carrying value of goodwill was deemed to be impaired, an impairment loss equal to the amount by which the carrying amount exceeds the estimated fair value would be recognized. Any such impairment could materially and adversely affect our financial condition and results of operations.

Foreign acquisitions would involve risks in addition to those mentioned above, including those related to integration of operations across different cultures and languages, currency risks and the particular economic, political and regulatory risks associated with specific countries. We may not be able to address these risks and uncertainties successfully, or at all, without incurring significant costs, delays or other operating problems.

Our inability to address or anticipate any of these risks and uncertainties could disrupt our business and could have a material impact on our financial condition and results of operations.

Our use of and reliance upon development resources in China may expose us to unanticipated costs or liabilities.

We operate a wholly foreign owned enterprise in Nanjing, China, where a dedicated team of engineers performs product development, quality assurance, cost reduction and other engineering work. We also outsource a portion of our software development to a team of software engineers based in Shenyang, China. Our reliance upon development resources in China may not enable us to achieve meaningful product cost reductions or greater resource efficiency. Further, our development efforts and other operations in China involve significant risks, including:

- difficulty hiring and retaining appropriate engineering resources due to intense competition for such resources and resulting wage inflation;
- the knowledge transfer related to our technology and exposure to misappropriation of intellectual property or confidential information, including information that is proprietary to us, our customers and third parties;

- heightened exposure to changes in the economic, security and political conditions of China;
- fluctuation in currency exchange rates and tax risks associated with international operations;
- development efforts that do not meet our requirements because of language, cultural or other differences associated with international operations, resulting in errors or delays; and
- uncertainty with regards to actions the Trump administration may take with respect to international trade agreements and U.S. tax provisions related to international commerce that could adversely affect our international operations.

Difficulties resulting from the factors above and other risks related to our operations in China could expose us to increased expense, impair our development efforts, harm our competitive position and damage our reputation.

Our customers are subject to government regulation, and changes in current or future laws or regulations that negatively impact our customers could harm our business.

The FCC has jurisdiction over all of our U.S. customers. FCC regulatory policies that create disincentives for investment in access network infrastructure or impact the competitive environment in which our customers operate may harm our business. For example, future FCC regulation affecting providers of broadband Internet access services could impede the penetration of our customers into certain markets or affect the prices they may charge in such markets. Similarly, changes to regulatory tariff requirements or other regulations relating to pricing or terms of carriage on communication networks could slow the development or expansion of network infrastructures. Consequently, such changes could adversely affect the sale of our products and services. Furthermore, many of our customers are subject to FCC rate regulation of interstate telecommunications services and are recipients of CAF capital incentive payments, which are intended to subsidize broadband and telecommunications services in areas that are expensive to serve. Changes to these programs, rules and regulations that could affect the ability of IOCs to access capital, and which could in turn reduce our revenue opportunities, remain possible.

In addition, many of our customers are subject to state regulation of intrastate telecommunications services, including rates for such services, and may also receive funding from state universal service funds. Changes in rate regulations or universal service funding rules, either at the U.S. federal or state level, could adversely affect our customers' revenue and capital spending plans. Moreover, various international regulatory bodies have jurisdiction over certain of our non-U.S. customers. Changes in these domestic and international standards, laws and regulations, or judgments in favor of plaintiffs in lawsuits against CSPs based on changed standards, laws and regulations could adversely affect the development of broadband networks and services. This, in turn, could directly or indirectly adversely impact the communications industry in which our customers operate.

Many jurisdictions, including international governments and regulators, are also evaluating, implementing and enforcing regulations relating to cyber security, privacy and data protection, which can affect the market and requirements for networking and communications equipment. To the extent our customers are adversely affected by laws or regulations regarding their business, products or service offerings, our business, financial condition and results of operations would suffer.

Privacy concerns relating to our products and services could affect our business practices, damage our reputation and deter customers from purchasing our products and services.

Government and regulatory authorities in the United States and around the world have implemented and are continuing to implement laws and regulations concerning data protection. For example, in July 2016, the European Commission adopted the EU-U.S. Privacy Shield to replace Safe Harbor as a compliance mechanism for the transfer of personal data from the European Union to the United States. In addition, the General Data Protection Regulation adopted by the EU Parliament goes into effect in May 2018 to harmonize data privacy laws across Europe. The interpretation and application of these data protection laws and regulations are often uncertain and in flux, and it is possible that they may be interpreted and applied in a manner that is inconsistent with our data practices. Complying with these various laws could cause us to incur substantial costs or require us to change our business practices in a manner adverse to our business.

Concerns about or regulatory actions involving our practices with regard to the collection, use, disclosure, or security of customer information or other privacy related matters, even if unfounded, could damage our reputation and adversely affect operating results. While we strive to comply with all data protection laws and regulations, the failure or perceived failure to comply may result in inquiries and other proceedings or actions against us by government entities or others, or could cause us to lose customers, which could potentially have an adverse effect on our business.

We are subject to cybersecurity and privacy risks.

Our information systems and data centers (including third-party data centers) contain sensitive information that help us operate our business efficiently, interface with and provide software solutions to customers, maintain financial accuracy and accurately produce our financial statements. In addition, we host sensitive data in data centers, including subscriber data, in the course of providing services and solutions to customers. Malicious hackers may attempt to gain access to our network or data centers; steal proprietary information related to our business, products, employees and customers; or interrupt our systems and services or those of our customers or others. The theft, loss or misuse of personal data collected, used, stored or transferred by us to run our business could result in significantly increased security and remediation costs or costs related to defending legal claims. If we do not allocate and effectively manage the resources necessary to build and sustain the proper technology infrastructure, we could be subject to cyberattacks, transaction errors, processing inefficiencies, the loss of customers, business disruptions or the loss of or damage to intellectual property through security breaches. If our data management systems, including those of our third-party data centers, do not effectively and securely collect, store, process and report relevant data for the operation of our business, whether due to cyberattacks, equipment malfunction or constraints, software deficiencies or human error, our ability to effectively plan, forecast and execute our business plan and comply with laws and regulations will be impaired, perhaps materially. Any such impairment could materially and adversely affect our financial condition, results of operations, cash flows, the timeliness with which we internally and externally report our operating results and our business and reputation.

While we have applied multiple layers of security to control access to our information technology systems and use encryption and authentication technologies to secure the transmission and storage of data, these security measures may be compromised as a result of third-party security breaches, employee error, malfeasance, faulty password management or other irregularity, and result in persons obtaining unauthorized access to our data or accounts. Third parties may attempt to fraudulently induce employees into disclosing user names, passwords or other sensitive information, which may in turn be used to access our information technology systems.

While we seek to apply best practice policies and devote significant resources to network security, data encryption and other security measures to protect our information technology and communications systems and data, these security measures cannot provide absolute security. We or our third-party hosting providers may experience a system breach and be unable to protect sensitive data. The costs to us to eliminate or alleviate network security problems, bugs, viruses, worms, malicious software programs and security vulnerabilities could be significant, and our efforts to address these problems may not be successful and could result in unexpected interruptions, delays and cessation of service which may harm our business operations.

Although our systems have been designed around industry-standard architectures to reduce downtime in the event of outages or catastrophic occurrences, they remain vulnerable to damage or interruption from earthquakes, floods, fires, power loss, telecommunication failures, terrorist attacks, cyberattacks, viruses, denial-of-service attacks, human error, hardware or software defects or malfunctions, and similar events or disruptions. Some of our systems are not fully redundant, and our disaster recovery planning is not sufficient for all eventualities. Our systems are also subject to break-ins, sabotage and intentional acts of vandalism. Despite any precautions we may take, the occurrence of a natural disaster, a decision by any of our third-party hosting providers to close a facility we use without adequate notice for financial or other reasons, a data breach or other unanticipated problems at our hosting facilities could cause system interruptions and delays which may result in loss of critical data and lengthy interruptions in our services.

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

Our products are subject to U.S. export and trade controls and restrictions. International shipments of certain of our products may require export licenses or are subject to additional requirements for export. In addition, the import laws of other countries may limit our ability to distribute our products, or our customers' ability to buy and use our products, in those countries. Changes in our products or changes in export and import regulations or duties may create delays in the introduction of our products in international markets, prevent our customers with international operations from deploying our products or, in some cases, prevent the export or import of our products to certain countries altogether. Any change in export or import regulations, duties or related legislation, shift in approach to the enforcement or scope of existing regulations, or change in the countries, persons or technologies targeted by such regulations, could negatively impact our ability to sell, profitably or at all, our products to existing or potential international customers.

If we lose any of our key personnel, or are unable to attract, train and retain qualified personnel, our ability to manage our business and continue our growth would be negatively impacted.

Our success depends, in large part, on the continued contributions of our key management, engineering, sales and marketing personnel, many of whom are highly skilled and would be difficult to replace. None of our senior management or key technical or sales personnel is bound by a written employment contract to remain with us for a specified period. In addition, we do not currently maintain key person life insurance covering our key personnel. If we lose the services of any key personnel, our business, financial condition and results of operations may suffer.

Competition for skilled personnel, particularly those specializing in engineering and sales, is intense. We cannot be certain that we will be successful in attracting and retaining qualified personnel, or that newly hired personnel will function effectively, both individually and as a group. In particular, we must continue to expand our direct sales force, including hiring additional sales managers, to grow our customer base and increase sales. If we are unable to effectively recruit, hire and utilize new employees, execution of our business strategy and our ability to react to changing market conditions may be impeded, and our business, financial condition and results of operations may suffer.

Volatility or lack of performance in our stock price may also affect our ability to attract and retain our key personnel. Our executive officers and employees hold a substantial number of shares of our common stock and vested stock options. Employees may be more likely to leave us if the shares they own or the shares underlying their equity awards decline in value, or if the exercise prices of stock options that they hold are significantly above the market price of our common stock. If we are unable to retain our employees, our business, operating results and financial condition will be harmed.

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired, which would adversely affect our operating results, our ability to operate our business and our stock price.

Ensuring that we have adequate internal financial and accounting controls and procedures in place to produce accurate financial statements on a timely basis is a costly and time-consuming effort that needs to be re-evaluated frequently. We have in the past discovered, and may in the future discover areas of our internal financial and accounting controls and procedures that need improvement.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles. Our management does not expect that our internal control over financial reporting will prevent or detect all error and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, within our company will have been detected.

We are required to comply with Section 404 of the Sarbanes-Oxley Act, or SOX, which requires us to expend significant resources in developing the required documentation and testing procedures. We cannot be certain that the actions we have taken and are taking to improve our internal controls over financial reporting will be sufficient to maintain effective internal controls over financial reporting in subsequent reporting periods or that we will be able to implement our planned processes and procedures in a timely manner. In addition, new and revised accounting standards and financial reporting requirements may occur in the future and implementing changes required by new standards, requirements or laws may require a significant expenditure of our management's time, attention and resources which may adversely affect our reported financial results. If we are unable to produce accurate financial statements on a timely basis, investors could lose confidence in the reliability of our financial statements, which could cause the market price of our common stock to decline and make it more difficult for us to finance our operations and growth.

We incur significant costs as a result of operating as a public company, which may adversely affect our operating results and financial condition.

As a public company, we incur significant accounting, legal and other expenses, including costs associated with our public company reporting requirements. We also anticipate that we will continue to incur costs associated with corporate governance requirements, including requirements and rules under SOX and the Dodd-Frank Wall Street Reform and Consumer Protection Act, or Dodd-Frank, among other rules and regulations implemented by the SEC, as well as listing requirements of the New York Stock Exchange, or NYSE. Furthermore, these laws and regulations could make it difficult or costly for us to obtain certain types of insurance, including director and officer liability insurance, and we may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these requirements could also make it difficult for us to attract and retain qualified persons to serve on our Board of Directors, our board committees or as executive officers.

New laws and regulations as well as changes to existing laws and regulations affecting public companies, including the provisions of SOX and the Dodd-Frank Act and rules adopted by the SEC and the NYSE, would likely result in increased costs to us as we respond to their requirements. We continue to invest resources to comply with evolving laws and regulations, and this investment may result in increased general and administrative expense.

Risks Related to Ownership of Our Common Stock

Our stock price may continue to be volatile, and the value of an investment in our common stock may decline.

The trading price of our common stock has been, and is likely to continue to be, volatile, which means that it could decline substantially within a short period of time and could fluctuate widely in response to various factors, some of which are beyond our control. These factors include those discussed in the "Risk Factors" section of this Annual Report on Form 10-K and others such as:

- quarterly variations in our results of operations or those of our competitors;
- failure to meet any guidance that we have previously provided regarding our anticipated results;
- changes in earnings estimates or recommendations by securities analysts;

- failure to meet securities analysts’ estimates;
- announcements by us or our competitors of new products, significant contracts, commercial relationships, acquisitions or capital commitments;
- developments with respect to intellectual property rights;
- our ability to develop and market new and enhanced products on a timely basis;

- our commencement of, or involvement in, litigation and developments relating to such litigation;
- changes in governmental regulations; and
- a slowdown in the communications industry or the general economy.

In recent years, the stock market in general, and the market for technology companies in particular, has experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of those companies. Broad market and industry factors may seriously affect the market price of our common stock, regardless of our actual operating performance. In addition, in the past, following periods of volatility in the overall market and the market price of a particular company's securities, securities class action litigation has often been instituted against these companies. This litigation, if instituted against us, could result in substantial costs and a diversion of our management's attention and resources.

If securities or industry analysts do not publish research or reports about our business or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. If any of the analysts who cover us issue an adverse or misleading opinion regarding our stock, our stock price would likely decline. If several of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

Provisions in our charter documents and under Delaware law could discourage a takeover that stockholders may consider favorable and may lead to entrenchment of our management and board of directors.

Our amended and restated certificate of incorporation and amended and restated bylaws contain provisions that could have the effect of delaying or preventing changes in control or changes in our management or our Board of Directors. These provisions include:

- a classified Board of Directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our Board of Directors;
- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;
- the exclusive right of our Board of Directors to elect a director to fill a vacancy created by the expansion of the Board of Directors or the resignation, death or removal of a director, which prevents stockholders from being able to fill vacancies on our Board of Directors;
- the ability of our Board of Directors to issue shares of preferred stock and to determine the price and other terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;
- the requirement that a special meeting of stockholders may be called only by the chairman of the Board of Directors, the chief executive officer or the Board of Directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- advance notice procedures that stockholders must comply with in order to nominate candidates to our Board of Directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

We are also subject to certain anti-takeover provisions under Delaware law. Under Delaware law, a corporation may not, in general, engage in a business combination with any holder of 15% or more of its capital stock unless the holder has held the stock for three years or, among other things, the Board of Directors has approved the transaction.

We may need additional capital in the future to finance our business.

We may need to raise additional capital to fund operations in the future. Although we believe that, based on our current level of operations and anticipated growth, our existing cash, cash equivalents and borrowings available under our Loan Agreement will provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next twelve months, our working capital needs and cash use have continued to increase to support our growth initiatives, and we may need additional capital if our current plans and assumptions change. Failure to maintain certain restrictive covenants and requirements under the Loan Agreement could result in limiting the amount of borrowings that are available to us, increase the cost of borrowings under the credit facility, and/or cause us to make immediate payments to reduce borrowings or result in an event of default. If future financings involve the issuance of equity securities, our then-existing stockholders would suffer dilution. If we raise additional debt financing, we may be subject to restrictive covenants that limit our ability to conduct our business. If we are unable to generate positive operating income and positive cash flows from operations, our liquidity, results of operations and financial condition will be adversely affected. Furthermore, if we are unable to generate sufficient cash flows to support our operational needs, we may need to seek additional sources of liquidity, including borrowings, to support our working capital needs. In addition, we may choose to seek other sources of liquidity even if we believe we have generated sufficient cash flows to support our operational needs. There is no assurance that any other sources of liquidity may be available to us on acceptable terms or at all. If we are unable to generate sufficient cash flows or obtain other sources of liquidity, we will be forced to limit our development activities, reduce our investment in growth initiatives and institute cost-cutting measures, all of which would adversely impact our business and growth.

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

We do not currently intend to pay any cash dividends on our common stock for the foreseeable future. We currently intend to invest our future earnings, if any, to fund our growth. Additionally, the terms of our credit facility restrict our ability to pay dividends under certain circumstances. Therefore, our stockholders are not likely to receive any dividends on our common stock for the foreseeable future.

ITEM 1B. Unresolved Staff Comments

None.

ITEM 2. Properties

We currently lease approximately 226,300 square feet of office space worldwide. Information concerning our principal leased properties as of December 31, 2017 is set forth below:

| Location | Principal Use | Square Footage | Lease Expiration Date |
|---|---|---|---|
| Petaluma, California | Corporate headquarters, sales, marketing, product design, service and repair engineering, distribution, research and development | 82,100 | February 2019 |
| San Jose, California | Product design, research and development, administration | 46,100 | August 2018 |
| Nanjing, China | Research and development | 42,800 | February 2021 |
| Minneapolis, Minnesota | Product design, research and development, service and repair engineering | 28,500 | March 2019 |
| Richardson, Texas | Service and test engineering | 14,400 | January 2022 |
| Santa Barbara, California | Research and development | 12,400 | June 2019 |

We believe that our facilities are in good condition and are generally suitable to meet our needs for the foreseeable future. We believe that prior to expiration of our current office space leases that we can renew or obtain suitable lease space on commercially reasonable terms for our business needs. In addition, we may continue to seek additional space as needed, and we believe this space will be available on commercially reasonable terms.

In March 2018, we entered a new office space lease in San Jose, California for 65,000 square feet, which commences in August 2018 for a term of 87 months.

ITEM 3. Legal Proceedings

From time to time, we are involved in various legal proceedings arising from the normal course of business. We are not currently a party to any legal proceedings that, if determined adversely to us, in our opinion, are currently expected to individually or in the aggregate have a material adverse effect on our business, operating results or financial condition taken as a whole.

ITEM 4. Mine Safety Disclosures

Not applicable.

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PART II

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

Comparative Stock Prices

Our common stock has been trading on the New York Stock Exchange, under the trading symbol “CALX” since our initial public offering on March 24, 2010. Prior to this time, there was no public market for our common stock. The following table sets forth, for the fiscal periods indicated, the high and low sale prices per share of our common stock as reported on NYSE.

| | High | Low |
|---|---|---|
| Fiscal Year 2017 | | |
| First Quarter | $7.76 | $6.15 |
| Second Quarter | 7.35 | 6.30 |
| Third Quarter | 7.10 | 4.65 |
| Fourth Quarter | 7.20 | 5.05 |

| | High | Low |
|---|---|---|
| Fiscal Year 2016 | | |
| First Quarter | $7.87 | $5.64 |
| Second Quarter | 7.76 | 6.24 |
| Third Quarter | 8.20 | 6.30 |
| Fourth Quarter | 8.10 | 6.15 |

Number of Common Stock Holders

As of March 2, 2018, the approximate number of holders of our common stock was 351 (not including beneficial owners of stock held in street name).

Dividends

We have never declared or paid any cash dividends on our common stock, and we do not currently intend to pay any cash dividends on our common stock in the foreseeable future. In addition, our credit facility requires Silicon Valley Bank's consent before dividends can be declared. See Note 6, “Credit Facility” of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

Recent Sales of Unregistered Securities

None.

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Performance Graph

The following graph shows a comparison of the cumulative total stockholder return on our common stock with the cumulative total returns of the Russell 2000 Index and the Morningstar Communication Equipment Index. The graph tracks the performance of a $100 investment in our common stock and in each of the indexes during the last five fiscal years ended December 31, 2017. Data for the Russell 2000 Index and the Morningstar Communication Equipment Index assume reinvestment of dividends. Stockholder returns over the indicated period are based on historical data and should not be considered indicative of future stockholder returns.

This performance graph shall not be deemed "soliciting material" or to be "filed" with the SEC for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any filing of Calix, Inc. under the Securities Act of 1933, as amended.

ITEM 6. Selected Financial Data

The following selected consolidated financial data should be read in conjunction with our consolidated financial statements and the related notes thereto, of this Annual Report on Form 10-K, the section titled "Management's Discussion and Analysis of Financial Condition and Results of Operations" and the other financial information and data appearing elsewhere in this Annual Report on Form 10-K. The selected financial data included in this section is not intended to replace and is not a substitute for, the consolidated financial statements and related notes in this Annual Report on Form 10-K.

We derived the statements of operations data for the years ended December 31, 2017, 2016 and 2015 and the balance sheet data as of December 31, 2017 and 2016 from our audited consolidated financial statements and related notes thereto of this Annual Report on Form 10-K. We derived the statements of operations data for the years ended December 31, 2014 and 2013, and the balance sheet data as of December 31, 2015, 2014 and 2013 from our audited consolidated financial statements and related notes which are not included in this Annual Report on Form 10-K. Historical results for any prior period are not necessarily indicative of future results for any period.

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| | Years Ended December 31, 2017 | 2016 | 2015 | 2014 | 2013 |
|---|---|---|---|---|---|
| | (In thousands, except per share data) | | | | |
| Statement of Operations Data: | | | | | |
| Revenue | $510,367 | $458,787 | $407,463 | $401,227 | $382,618 |
| Cost of revenue [1] | 337,477 | 257,569 | 217,034 | 223,438 | 211,544 |
| Gross profit | 172,890 | 201,218 | 190,429 | 177,789 | 171,074 |
| Operating expenses: | | | | | |
| Research and development [1] | 127,541 | 106,869 | 89,714 | 80,311 | 79,299 |
| Sales and marketing [1] | 82,781 | 83,675 | 78,563 | 76,283 | 68,075 |
| General and administrative [1] | 39,875 | 41,592 | 38,454 | 31,371 | 31,945 |
| Restructuring charges | 4,249 | — | — | — | — |
| Amortization of intangible assets | — | 1,701 | 10,208 | 10,208 | 10,208 |
| Litigation settlement gain | — | (4,500) | — | — | — |
| Total operating expenses | 254,446 | 229,337 | 216,939 | 198,173 | 189,527 |
| Loss from operations | (81,556) | (28,119) | (26,510) | (20,384) | (18,453) |
| Interest and other income (expense), net [2] | (233) | 1,064 | 712 | 151 | 1,174 |
| Loss before provision for (benefit from) income taxes | (81,789) | (27,055) | (25,798) | (20,233) | (17,279) |
| Provision for (benefit from) income taxes | 1,243 | 347 | 535 | 581 | (14) |
| Net loss | $(83,032) | $(27,402) | $(26,333) | $(20,814) | $(17,265) |
| Net loss per common share: | | | | | |
| Basic and diluted | $(1.66) | $(0.56) | $(0.51) | $(0.41) | $(0.35) |
| Weighted-average number of shares used to compute net loss per common share: | | | | | |
| Basic and diluted | 50,155 | 48,730 | 51,489 | 50,808 | 49,419 |
| [1] Includes stock-based compensation as follows: | | | | | |
| Cost of revenue | $749 | $672 | $709 | $1,120 | $1,468 |
| Research and development | 4,869 | 5,125 | 4,797 | 5,056 | 4,896 |
| Sales and marketing | 3,433 | 4,586 | 4,712 | 5,601 | 5,577 |
| General and administrative | 3,317 | 3,902 | 3,587 | 4,240 | 7,980 |
| Total | $12,368 | $14,285 | $13,805 | $16,017 | $19,921 |

[2] 2013 includes $1.7 million of gain from utilization of inventory credit.

| | December 31, 2017 | 2016 | 2015 | 2014 | 2013 |
|---|---|---|---|---|---|
| | (In thousands) | | | | |
| Balance Sheet Data: | | | | | |
| Cash, cash equivalents and marketable securities | $39,775 | $78,107 | $73,590 | $111,679 | $82,747 |
| Working capital | 34,123 | 97,926 | 115,561 | 131,693 | 114,366 |
| Total assets | 295,070 | 355,475 | 323,886 | 370,221 | 383,599 |
| Common stock and additional paid-in capital | 852,475 | 837,931 | 820,080 | 803,101 | 783,509 |
| Total stockholders' equity | 144,963 | 212,964 | 235,785 | 272,591 | 273,923 |

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

The Management's Discussion and Analysis of Financial Condition and Results of Operations contains forward-looking statements regarding future events and our future results that are subject to the safe harbors created under the Securities Act of 1933 (the "Securities Act") and the Securities Exchange Act of 1934 (the "Exchange Act"). All statements other than statements of historical facts are statements that could be deemed forward-looking statements. These statements are based on current expectations, estimates, forecasts and projections about the industry in which we operate and the beliefs and assumptions of our management. In some cases, forward-looking statements can be identified by the use of words such as "believe," "expect," "may," "estimate," "continue," "anticipate," "intend," "should," "pl "predict," "will," "project," "potential," or the negative thereof or other comparable terminology. In addition, any statements that refer to projections of our future financial performance, our anticipated growth and trends in our businesses and other characterizations of future events or circumstances are forward-looking statements. Readers are cautioned that these forward-looking statements are only predictions and are subject to risks, uncertainties and assumptions that are difficult to predict, including those identified in the Risk Factors discussed in Item 1A, in the discussion below, as well as in other sections of this Annual Report on Form 10-K. Therefore, actual results may differ materially and adversely from those expressed in any forward-looking statements. All forward-looking statements and reasons why results may differ included in this report are made as of the date hereof, and we assume no obligation to update these forward-looking statements or reasons why actual results might differ.

Overview

We are a leading global provider of cloud and software platforms, systems and software for fiber- and copper-based network architectures and a pioneer in software defined access and cloud products focused on access networks and the subscriber. Calix's portfolio allows for a broad range of subscriber services to be provisioned and delivered over a single unified network. Our access systems can deliver voice and data services, advanced broadband services, mobile broadband, as well as high-definition video and online gaming. Our premises systems will allow CSPs to master the complexity of the smart home and business and offer new services to their device enabled subscribers. And, all of these platforms and systems can be monitored, analyzed, managed and supported by Calix Cloud.

We market our cloud and software platforms, systems and services to CSPs globally through our direct sales force as well as a number of resellers. As of December 31, 2017, over 25 million ports of the Calix portfolio have been deployed at a growing number of CSPs worldwide. Our customers range from smaller, regional CSPs to some of the world's largest CSPs. We have enabled over 1,400 customers to deploy gigabit passive optical network, Active Ethernet and point-to-point Ethernet fiber access networks.

Our revenue increased to $510.4 million for 2017 from $458.8 million for 2016 and $407.5 million for 2015. Our revenue and continued revenue growth will depend on our ability to sell and license our cloud and software platforms, systems and services to existing customers and to attract new customers, particularly larger CSPs, globally. During 2017, we continued to see growth in our services business to meet customer demand for turnkey solutions that include professional services together with the supply of equipment and materials, including projects that are funded by the FCC's current CAF program. Specifically, during 2017, we completed a significant turnkey network improvement project that we had commenced in 2015 and the vast majority of previously-awarded CAF projects by the fourth quarter of 2017. Revenue for such projects is generally recognized only when all project requirements are completed, which typically requires longer periods depending on the nature and scope of the project. Similarly, some of the costs incurred by us for such projects, including labor and related costs, are deferred and recognized to cost of revenue when the associated revenue is recognized.

Revenue fluctuations result from many factors, including: increases or decreases in customer orders for our products and services, market or other factors that may delay or materially impact customer purchasing decisions, contractual terms with customers that result in delayed revenue recognition and varying budget cycles and seasonal buying patterns of our customers. More specifically, our customers tend to spend less in the first quarter as they are finalizing their annual budgets, and in certain regions, customers are also challenged by winter weather conditions that inhibit fiber deployment in outside infrastructure. Our revenue is also dependent upon our customers' timing of purchases and capital expenditure plans, including expenditure plans for turnkey solutions projects, which are generally non-recurring in nature. In particular, at the end of 2017, we experienced significantly lower order volumes by our

largest customer due to the timing of their recent acquisition, and we expect that this acquisition may continue to disrupt the customer's normal expenditure plans, including continued delays and reduction in purchases of our products and services as it implements its transition activities and corporate strategies. The timing of recognition of deferred revenue may cause significant fluctuations in our revenue and operating results from period to period.
Cost of revenue is strongly correlated to revenue and tends to fluctuate due to all of the above factors that could impact revenue. Factors that impacted our cost of revenue for 2017, and that may impact cost of revenue in future periods, also include: changes in the mix of products delivered, customer location and regional mix, changes in product warranty and incurrence of retrofit costs, changes in the cost of our inventory and inventory write-downs. Cost of services revenue has been impacted during 2017 by increases in the pace of professional services activity due to customer requirements and project

deadlines, higher than anticipated costs associated with delivery of professional services for which project pricing is typically set at the outset of the project, charges related to cost overruns on service projects and inefficiencies associated with delays resulting from third party dependencies and incremental costs to rework. Cost of revenue also includes fixed expenses related to our internal operations, which could impact our cost of revenue as a percentage of revenue if there are large fluctuations in revenue.

Cost of revenue has a direct impact on gross profit and gross margin. During 2017, our gross profit and gross margin continued to be negatively impacted by an increase in our services revenue, which carried negative gross margin associated with our turnkey network improvement projects, as a mix of total revenue. We have continued to incur higher costs related to our professional services business for turnkey network improvement projects, largely associated with projects initiated in 2016. Overall, our gross profit and gross margin fluctuate based on timing of factors such as new product introductions or upgrades to existing products, changes in customer mix, changes in the mix of products demanded and sold (and any related write-downs of existing inventory), increases in mix of revenue towards professional services, increases in mix of revenue from channel sales rather than direct sales or other unfavorable customer or product mix, shipment volumes and any related volume discounts, changes in our product and services costs, pricing decreases or discounts, customer rebates and incentive programs due to competitive pressure. To the extent that deferred costs related to the professional services portion of turnkey projects is determined to be unrecoverable, we incur a charge to cost of services revenue in the period such cost is determined to be unrecoverable. In connection with our recoverability assessment as of December 31, 2017, we did not have any write downs of our deferred costs. See the risk factor titled “An increase in revenue mix towards services will adversely affect our gross margin” above in the “Risk Factors” section of this Annual Report on Form 10-K.

Our operating expenses have fluctuated based on the following factors: changes in headcount and personnel costs which comprise a significant portion of our operating expenses, timing of variable compensation expenses due to fluctuations in order volumes, timing of research and development expenses including investments in innovative solutions, such as next generation solutions and new customer segments, prototype builds and outsourced development projects, fluctuations in stock-based compensation expenses due to timing of equity grants or other factors affecting vesting, changes in acquisition-related expenses and timing of litigation-related costs. During 2017, our total operating expenses increased due to an increase in headcount and outside contractors, primarily for research and development and, to a lesser extent, as a result of restructuring charges incurred during 2017. In March 2017, we adopted a restructuring plan to realign our business to increase focus towards investments in software defined access and cloud products and to reduce the expense structure in our traditional systems business, for which we incurred pre-tax restructuring charges of $4.2 million during 2017.

Our net loss was $83.0 million in 2017, $27.4 million in 2016 and $26.3 million in 2015. Since our inception, we have incurred significant losses, and as of December 31, 2017, we had an accumulated deficit of $667.4 million. Further, as a result of the fluctuations described above and a number of other factors, many of which are outside our control, our annual operating results fluctuate from period to period. Comparing our operating results on a period-to-period basis may not be meaningful, and you should not rely on our past results as an indication of our future performance.

## Product Line Divestiture

In February 2018, we sold our outdoor cabinet product line to Clearfield, Inc. for $10.4 million in cash and the assumption by Clearfield of related product warranty liabilities and open purchase order commitments with our contract manufacturer. The divestiture of this non-strategic product line reflects our continued focus on execution on our platforms and business strategy. See Note 15, “Subsequent Events” of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

## Critical Accounting Policies and Estimates

Our financial statements are prepared in accordance with U.S. GAAP. These accounting principles require us to make certain estimates and judgments that can affect the reported amounts of assets and liabilities as of the date of the financial statements, as well as the reported amounts of revenue and expenses during the periods presented. We base our estimates, assumptions and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances. To the extent there are material differences between these estimates and actual results, our financial statements may be affected. We evaluate our estimates, assumptions and judgments on an

ongoing basis.
We believe the following critical accounting policies affect our significant judgments and estimates used in the preparation of our financial statements.
Revenue Recognition
We derive revenue primarily from the sale of access and premise systems, services and cloud and software platforms. Revenue is recognized when all of the following criteria have been met:

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- Persuasive evidence of an arrangement exists. We generally rely upon sales agreements and customer purchase orders as evidence of an arrangement.
- Delivery has occurred. We use the shipping terms of the arrangement or evidence of customer acceptance to verify delivery or performance.
- Sales price is fixed or determinable. We assess whether the sales price is fixed or determinable based on the payment terms and whether the sales price is subject to refund or adjustment. Payment terms to customers can range from net 30 up to net 180 days.
- Collectability is reasonably assured. We assess collectability based primarily on creditworthiness of customers and their payment histories.

Revenue from installation and training services is recognized as the services are completed. Revenue from post-sales software support and extended warranty services are deferred and recognized ratably over the period during which the services are to be performed. In instances where substantive acceptance provisions are specified in the customer agreement, revenue is deferred until the acceptance criteria have been met. From time to time, we offer customers sales incentives, which include volume rebates and discounts. These amounts are estimated on a quarterly basis and recorded as a reduction of revenue.

We enter into arrangements with certain of our customers who receive government supported loans and grants from the RUS to finance capital spending. Under the terms of a RUS equipment contract that includes installation services, the customer does not take possession and control and title does not pass until formal acceptance is obtained from the customer. Under this type of arrangement, we do not recognize revenue until we have received formal acceptance from the customer. For RUS arrangements that do not involve installation services, we recognize revenue when all of the revenue recognition criteria as described above have been met.

Our products contain both software and non-software components that function together to deliver the products' essential functionality. When we enter into sales arrangements that consist of multiple deliverables of our product and service offerings, we allocate the total consideration of the arrangement to each separable deliverable based on their relative selling price. We limit the amount allocable to delivered elements to the amount that is not contingent upon the delivery of additional items or meeting specified performance conditions, and we recognize revenue on each deliverable in accordance with our revenue policy. The determination of selling price for each deliverable is based on a selling price hierarchy, which is vendor-specific objective evidence, or VSOE, if available, third-party evidence, or TPE, if VSOE is not available, or estimated selling price, or ESP, if neither VSOE nor TPE is available. VSOE of selling price is based on the price charged when the element is sold separately. In determining VSOE, we generally require that a substantial majority of the selling prices of an element fall within a narrow range when each element is sold separately. We have established VSOE for our training and post-sales software support services based on the normal pricing practices of these services when sold separately. TPE of selling price is established by evaluating whether there are similar competitor products or services that are sold in stand-alone sales transaction to similarly situated customers. Generally, our marketing strategy differs from that of our peers and our offerings contain a significant level of customization and differentiation such that the comparable pricing of products with similar functionality cannot be obtained. Additionally, as we are unable to reliably determine what similar competitor products' selling prices are on a stand-alone basis, we are not typically able to determine TPE. ESP is established considering multiple factors including, but not limited to geographies market conditions, competitive landscape, internal costs, gross margin objectives, characteristics of targeted customers and pricing practices. The determination of ESP is made through consultation with and formal approval by management, taking into consideration the go-to-market strategy. See "Recent Accounting Pronouncements Not Yet Adopted – Revenue from Contracts with Customers" below.

Stock-Based Compensation

Stock-based awards are recorded at fair value as of the grant date and recognized to expense over the employee's requisite service period (generally the vesting period), which we have elected to amortize on a straight-line basis. We value restricted stock units, or RSUs, and employee stock purchase right under Nonqualified Employee Stock Purchase Plan, or Nonqualified ESPP, at the closing market price of our common stock on the date of grant.

Stock-based compensation expense associated with performance restricted stock units, or PRSUs, with graded vesting features and which contain both a performance and a service condition is measured based on the closing market price of our common stock on the date of grant, and is recognized, net of forfeitures, as expense over the requisite service period using the graded vesting attribution method. Compensation expense is only recognized if we have determined that it is probable that the performance condition will be met. We reassess the probability of vesting at each reporting period and adjusts compensation expense based on this probability assessment.

Stock-based compensation expense associated with performance-based stock options with graded vesting features and which contain both a performance and a service condition is measured based on fair value of stock option estimated at the grant date using the Black-Scholes option valuation model, and is recognized, net of forfeitures, as expense over the requisite service period using the graded vesting attribution method.

We estimate the fair value of stock options and employee stock purchase rights under our Amended and Restated Employee Stock Purchase Plan, or ESPP, at the grant date using the Black-Scholes option-pricing model. This model requires the use of highly judgmental assumptions, including expected stock price volatility and expected life of the stock options, which have a significant impact on the fair value estimates and are discussed in detail in Note 8, "Stockholders' Equity" of Notes to Consolidated Financial Statements in this Annual Report on Form 10-K. Changes to these estimates will cause the fair values of our stock options and employee stock purchase right under the ESPP and related stock-based compensation expense that we record to vary.

In addition, we apply an estimated forfeiture rate to awards granted and record stock-based compensation expense only for those awards that are expected to vest. Forfeiture rates are estimated at the time of grant based on our historical experience. Further, to the extent our actual forfeiture rates are different from our estimates, stock-based compensation is adjusted accordingly.

Inventory Valuation

Inventory, which primarily consists of finished goods purchased from contract manufacturers, is stated at the lower of cost, determined by the first-in, first-out method, and net realizable value. Inbound shipping costs are included in the cost of inventory. In addition, we, from time to time, procure component inventory primarily as a result of manufacturing discontinuation of critical components by suppliers. We regularly monitor inventory quantities on-hand and record write-downs for excess and obsolete inventories based on our estimate of demand for our products, potential obsolescence of technology, product life cycle and whether pricing trends or forecasts indicate that the carrying value of inventory exceeds our estimated selling price. These factors are impacted by market and economic conditions, technology changes and new product introductions and require estimates that may include elements that are uncertain. Actual demand may differ from forecasted demand and may have a material effect on gross profit. If inventory is written down, a new cost basis is established that cannot be increased in future periods. The sale of previously reserved inventory has not had a material impact on our gross margin.

Income Taxes

We evaluate our tax positions and estimate our current tax exposure in each jurisdiction in which we operate. This includes assessing the temporary differences resulting from differing treatment of items not currently deductible for tax purposes. These differences result in deferred tax assets and liabilities on our consolidated balance sheets, which are calculated based upon the difference between the financial statement and tax bases of assets and liabilities using the enacted tax rates that will be in effect when these differences reverse. In general, deferred tax assets represent future tax benefits to be received when certain expenses previously recognized in our consolidated statements of comprehensive loss become deductible expenses under applicable income tax laws or loss or credit carry-forwards are utilized. Since realization of our deferred tax assets is dependent on future taxable income against which these deductions, losses and credits can be utilized, we must assess the likelihood that our deferred tax assets will be recovered from future taxable income. To the extent we believe that recovery is below the more likely than not threshold, we must establish a valuation allowance against the net deferred tax asset. Significant judgment is required in determining our provision for income taxes, our deferred tax assets and liabilities and any valuation allowance recorded against net deferred tax assets.

Since inception, we have incurred operating losses and accordingly have federal and state net operating loss carry-forwards of $604.1 million and $210.2 million, respectively, as of December 31, 2017. The U.S. federal net operating loss carryforwards will expire at various dates beginning in 2019 and through 2037, if not utilized. The state net operating loss carryforwards will expire at various dates beginning in 2018 and through 2037, if not utilized. Additionally, we had U.S. federal, California and other U.S. states research and development credits of approximately $31.0 million, $33.4 million and $3.2 million, respectively, as of December 31, 2017. The U.S. federal research and development credits will begin to expire in 2020 and through 2036 and the California research and development credits have no expiration date. The credits related to other various U.S. states will begin to expire in 2018 and through 2032. These two items account for the bulk of our gross deferred tax asset of $198.8 million as of December 31, 2017. Excluding our foreign operations, we have recorded a full valuation allowance against the gross deferred assets at each balance sheet date presented. We believe that based on the available evidence and history of operation losses, it is more likely than not that we will not be able to utilize all of our deferred assets, with the exception of certain foreign deferred tax assets, before expiration. We intend to maintain the full valuation allowance until sufficient evidence exists to support the reversal of the valuation allowance.

Loss Contingencies

We accrue loss contingencies when the loss is probable and reasonably estimable. In addition, disclosure of a loss contingency is required if there is at least a reasonable possibility that a loss (or an additional loss above the amount accrued) has been incurred.

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From time to time, we are involved in legal proceedings arising from the normal course of business activities. We evaluate the likelihood of an unfavorable outcome of legal proceedings to which we are a party and accrue a loss contingency when the loss is probable and reasonably estimable. Assessing legal contingencies involves significant judgment and estimates and the outcome of litigation is inherently uncertain and subject to numerous factors outside our control. Significant judgment is required when we assess the likelihood of any adverse judgments or outcomes, including the potential range of possible losses, and whether losses are probable and reasonably estimable.

We offer initial limited warranties for our hardware products for a period of one, three or five years, depending on the product type. Under certain circumstances, we also provide fixes on specifically identified performance failures for products that are outside of the standard warranty period and recognize estimated costs related to retrofit activities upon identification of such product failures. We estimate costs related to warranty and retrofit activities based upon historical and projected product failure and claim rates, historical costs incurred in correcting product failures along with other relevant information available related to any specifically identified product failures. We recognize estimated warranty and retrofit costs when it is probable that a liability has been incurred and the amount of loss is reasonably estimable. Significant judgment is required in estimating costs associated with warranty and retrofit activities and our estimates are limited to information available to us at the time of such estimates. In some cases, such as when a specific product failure is first identified or a new product is introduced, we may initially have limited information and limited historical failure and claim rates upon which to base our estimates, and such estimates may require revision in future periods.

Because of uncertainties related to these matters, our estimates of whether a loss contingency is probable or reasonably possible, as well as the reasonable range of possible losses associated with each loss contingency, is based only on the information available at the time. As additional information becomes available, and at least quarterly, we reassess the potential liability on each significant matter and may revise our estimates. These revisions could have a material impact on our business, operating results or financial condition, and the actual outcomes may materially differ from our estimates of potential liability, which could have a material adverse effect on our business, operating results or financial condition.

Recent Accounting Pronouncements Not Yet Adopted

Leases

In February 2016, the Financial Accounting Standards Board, or FASB, issued Accounting Standards Update No. 2016-02, Leases (Topic 842), or ASU 2016-02, which requires recognition of an asset and liability for lease arrangements longer than twelve months. ASU 2016-02 will be effective for us beginning in the first quarter of 2019. Early application is permitted, and it is required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. We are not planning to early adopt, and accordingly, will adopt the new standard effective January 1, 2019. We intend to elect the available practical expedients on adoption. We are currently assessing the potential impact of adopting this new guidance on our consolidated financial statements. We expect our assets and liabilities to increase as the new standard requires recognition of right-of-use assets and lease liabilities for operating leases, but do not expect any material impact on our income (loss) from operations or net income (loss) as a result of the adoption of this standard.

Revenue from Contracts with Customers

In May 2014, the FASB issued Accounting Standards Update No. 2014-09, Revenue from Contracts with Customers (Topic 606), or ASU 2014-09, which provides guidance for revenue recognition. ASU 2014-09 supersedes the revenue recognition requirements in Topic 605, Revenue Recognition, and most industry-specific guidance. Additionally, it supersedes some cost guidance included in Subtopic 605-35, Revenue Recognition – Construction-Type and Production-Type Contracts, and creates new Subtopic 340-40, Other Assets and Deferred Costs – Contracts with Customers. The standard’s core principle is that a company will recognize revenue when it transfers promised goods or services to customers in an amount that reflects the consideration to which the company expects to be entitled in exchange for those goods or services. In doing so, companies will need to use more judgment and make more estimates than under the previous guidance. These may include identifying performance obligations in the contract, estimating the amount of variable consideration to include in the transaction price and allocating the transaction price to each separate performance obligation. On August 12, 2015, the FASB issued Accounting

Standards Update No. 2015-14, Revenue from Contracts with Customers (Topic 606), Deferral of the Effective Date, or ASU 2015-14, to defer the effective date of ASU 2014-09 by one year. ASU 2015-14 permits early adoption of the new revenue standard, but not before its original effective date. In April 2016, the FASB issued Accounting Standards Update No. 2016-10, Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing, or ASU 2016-10, which further clarifies guidance related to identifying performance obligations and licensing implementation guidance contained in ASU 2014-09. In May 2016, the FASB issued Accounting Standards Update No. 2016-12, Revenue from Contracts with Customers (Topic 606): Narrow-Scope Improvements and Practical Expedients, ASU 2016-12, which addresses narrow-scope improvements to the guidance on collectability, non-cash consideration, and completed contracts at transition and provides a practical expedient for contract modifications at transition and an accounting policy election related to the presentation of sales taxes and other similar taxes collected from customers.

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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 adopted the new standard effective January 1, 2018 using the modified retrospective transition method applied to those contracts which are not completed as of that date, which will result in a cumulative catch up adjustment to decrease our accumulated deficit as of January 1, 2018, by approximately $1 million and will require additional disclosures, including disclosures comparing results under the new standard to current GAAP during 2018. We are still assessing the final impact of adoption on one minor revenue stream, but expect the impact to be immaterial.

A description of the impact of the new standard on our business is as follows:

- For stand-alone purchase orders, while the allocation of revenue to deliverables between products and services may change due to new methodologies under the standard, we expect that the impact of this adjustment will not be significant.
- For products sold with our turnkey network improvement projects, the recognition of revenue under current GAAP was often delayed until project completion as a result of our not meeting certain recognition criteria. Under the new standard, revenue from these arrangements may be accelerated as revenue on products may be recognized upon delivery and services may be recognized over time as the services are performed. As there were minimal open projects under turnkey arrangements as of December 31, 2017, the impact of this change on our accumulated deficit is not expected to be significant although it could have a material impact on the timing of revenue recognition in the future.
- Revenue from our Cloud product offerings is not expected to be impacted by the adoption of the new standard.
- Under current GAAP, revenue from software licenses is recognized ratably over the term of the related post-contract support, or PCS, as we did not have VSOE for PCS for the licenses sold to date. Under the new standard, revenue allocated to the licenses is expected to be recognized upon delivery while the revenue allocated to PCS is expected to be recognized ratably. The impact of this change was not material to our accumulated deficit upon adoption as we only began selling software licenses in 2017.

In connection with the adoption of the new revenue standard effective January 1, 2018, we also adopted ASC 340-40, Other Assets and Deferred Costs – Contracts with Customers, with respect to capitalization and amortization of incremental costs of obtaining a contract. As a result, we will capitalize additional costs of obtaining a contract, including sales commissions, as the guidance requires the capitalization of all incremental costs incurred to obtain a contract with a customer that it would not have incurred if the contract had not been obtained, provided it expects to recover the costs. We have determined that sales commissions as a result of obtaining extended warranty customer contracts are recoverable, and as a result, we will defer $0.8 million of related sales commissions, which will result in a cumulative catch up adjustment to decrease our accumulated deficit as of January 1, 2018, and amortize them over the period that the related revenue is recognized. The adoption of this standard is not expected to have a material impact to our consolidated financial statements.

Results of Operations for Years Ended December 31, 2017, 2016 and 2015

Revenue

Our revenue is comprised of the following:

- Products – includes revenue from the sale of access and premises systems, platform software licenses and cloud-based software subscriptions.
- Services – includes revenue from professional services, customer support, software and cloud-based maintenance, extended warranty subscriptions, training and managed services.

The following table sets forth our revenue (in thousands, except for percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Revenue: | | | | | | | |
| Products | $421,890 | $428,584 | $385,679 | $(6,694 ) | (2 )% | $42,905 | 11% |
| Services | 88,477 | 30,203 | 21,784 | 58,274 | 193 % | 8,419 | 39% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | $510,367 | $458,787 | $407,463 | $51,580 | 11 | % | $51,324 | 13% |

| | | | | | | |
|---|---|---|---|---|---|---|
| Percent of total revenue: | | | | | | |
| Products | 83 | % | 93 | % | 95 | % |
| Services | 17 | % | 7 | % | 5 | % |
| | 100 | % | 100 | % | 100 | % |

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Our revenue is principally derived in the United States. Revenue generated in the United States represented approximately 89% of our total revenue in 2017, 91% in 2016 and 88% in 2015.

2017 compared to 2016: The increase in revenue during 2017 compared with 2016 resulted from an increase in services revenue by $58.3 million, or 193%, primarily driven by the substantial completion of services associated with a significant turnkey network improvement project during the first quarter of 2017 and the completion of the vast majority of sites from previously-awarded CAF projects by the fourth quarter of 2017. Our product revenue decreased by $6.7 million mainly due to lower shipments to one of our large Tier 2 customers relative to the prior year period related to a significant turnkey network improvement project in 2016, which was completed in the first half of 2017. We expect our services revenue to decline in 2018 as the significant turnkey network improvement project completed in early 2017 for this customer is not expected to reoccur and we expect the overall volume of CAF projects to be lower in 2018 relative to 2017. These decreases are expected to be partially offset by an increase in services revenue associated with sales of our platform solutions. We believe that the divestiture of our cabinet product line in February 2018 reduces our operational complexity as we focus on deployments of our platform products to capitalize on the revenue growth opportunity as our industry transforms.

We had one customer that accounted for more than 10% of our total revenue in 2017 and 2015 and two customers that each accounted for more than 10% of our total revenue in 2016. See Note 1 to the Consolidated Financial Statements set forth in this report for more details on concentration of revenue for the periods presented.

2016 compared to 2015: The increase in revenue during 2016 compared with 2015 resulted from stronger bookings and shipments as customer demand increased. This was led by higher demand from our larger domestic customers for both products and services with the increase in services associated with our turnkey network improvement projects. The increase in revenue was partially offset by lower demand from our international markets and lower revenue derived from contracts funded by the Broadband Stimulus programs under the ARRA as we completed and closed our existing contracts. The extended date for completion of projects funded under the Broadband Initiatives Program, which is administered by the RUS, ended on July 31, 2015.

Cost of Revenue, Gross Profit and Gross Margin

The following table sets forth our cost of revenue (in thousands, except for percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Cost of revenue: | | | | | | | |
| Products | $236,137 | $228,976 | $204,726 | $7,161 | 3 % | $24,250 | 12 % |
| Services | 101,340 | 28,593 | 12,308 | 72,747 | 254% | 16,285 | 132% |
| | $337,477 | $257,569 | $217,034 | $79,908 | 31 % | $40,535 | 19 % |

2017 compared to 2016: The increase in cost of revenue of $79.9 million during 2017 as compared to 2016 was primarily attributable to an increase in cost of services revenue by $72.7 million, as we experienced higher levels of service activities, as well as higher costs attributed to rework, delays, unanticipated costs and overruns (including third party costs) for our turnkey network improvement projects. Our cost of product revenue increased by $7.2 million during 2017 compared with 2016 primarily due to a product mix shift to lower margin products, partially offset by the lower volume of revenue. Cost of product revenue also included an increase in inventory write-downs of $2.9 million attributed to slow moving inventories, partially offset by a decrease in warranty and retrofit costs of $1.2 million primarily related to certain retrofit charges for two specific product families.

2016 compared to 2015: The increase in cost of revenue of $40.5 million during 2016 as compared to 2015 was primarily attributed to an increase in cost of product revenue of $24.3 million mainly due to higher shipments. In addition, our warranty and retrofit costs increased by approximately $5.2 million primarily driven by certain retrofit charges for two specific product families. This was partially offset by a decrease in inventory write-downs attributed to slow moving inventories by approximately $3.5 million. Additionally, amortization of intangible assets decreased by $4.2 million in 2016 as compared to 2015 as one intangible asset reached completion of its amortization period before the end of the first quarter of fiscal 2016. Hence, we have a shorter amortization period for that particular intangible asset during 2016 as compared with full amortization in 2015. Our cost of services revenue increased by

$16.3 million as we continued to ramp up our professional services business to meet demand for turnkey professional services solutions and incurred higher costs as we accelerated activity at the end of the year to meet project schedules.

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The following table sets forth our gross profit and gross margin (dollars in thousands):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Gross profit: | | | | | | | |
| Products | $185,753 | $199,608 | $180,953 | $(13,855) | (7)% | $18,655 | 10% |
| Services | (12,863) | 1,610 | 9,476 | (14,473) | (899)% | (7,866) | (83)% |
| Total gross profit | $172,890 | $201,218 | $190,429 | $(28,328) | (14)% | $10,789 | 6% |
| Gross margin: | | | | | | | |
| Products | 44% | 47% | 47% | | | | |
| Services | (15)% | 5% | 43% | | | | |
| Total gross margin | 34% | 44% | 47% | | | | |

2017 compared to 2016: Gross profit decreased by $28.3 million to $172.9 million during 2017 from $201.2 million during 2016. Gross margin decreased to 34% during 2017 from 44% during 2016. The decrease in gross profit and gross margin during 2017 was primarily due to an increase in revenue mix toward service revenue as we continued to grow our professional services business, an increased level of activities in our turnkey network improvement projects and higher costs attributed to services rework and overruns. The rework costs and overruns generally relate to projects that were started in 2016 that incurred higher than anticipated costs from third party contractors, project delays, third party dependencies, quality issues associated with subcontracted work, rework to meet customer requirements and longer than anticipated time to complete. The vast majority of these 2016 projects were completed by the end of 2017. Looking forward, we expect to continue to drive efficiencies in our delivery of professional services for turnkey network improvement projects to improve services gross margin.

The decrease in the product gross margin was primarily attributed to product and regional mix as well as higher inventory write-downs, partly offset by lower warranty and retrofit charges as described above.

2016 compared to 2015: Gross profit increased by $10.8 million from $190.4 million during 2015 to $201.2 million during 2016 mainly due to higher product shipments, partially offset by higher cost of revenue from professional services projects. Gross margin decreased to 44% during 2016 from 47% during 2015. The decrease in gross margin during 2017 was primarily due to an increase in revenue mix toward services revenue as we continued to ramp our services business in 2016. Services revenue typically has higher associated costs and lower margins. The decrease in gross margin was partially offset by the impact of lower amortization of intangible assets during 2016 as compared to 2015.

## Operating Expenses

### Research and Development Expenses

Research and development expenses represent the largest component of our operating expenses and include personnel costs, outside contractor and consulting services, depreciation on lab equipment, costs of prototypes and overhead allocations. The following table sets forth our research and development expenses (in thousands, except for percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Research and development | $127,541 | $106,869 | $89,714 | $20,672 | 19% | $17,155 | 19% |
| Percent of total revenue | 25% | 23% | 22% | | | | |

2017 compared to 2016: The increase in research and development expenses during 2017 compared with 2016 was primarily due to an increase in expenses for outside contractors by $15.0 million and expenditures relating to prototype and expendable equipment used for research and development activities by $0.8 million, primarily for development services including investments in our cloud and software platforms and next generation systems to pursue broader growth opportunities. Our personnel for research and development also increased in 2017 as compared to 2016, which resulted in higher compensation and employee benefits (other than bonuses) of $4.8 million. This increase was partially offset by lower employee bonuses of $0.6 million in 2017 as compared to 2016.

Research and development expenses as a percentage of total revenue increased from 23% in 2016 to 25% in 2017 as we accelerated our research and development investments in 2017 in order to deliver our next generation cloud and software platforms and systems and address new market segments. With our platforms spanning a growing share of our systems products and moving into commercial deployments, we anticipate that the bulk of the fundamental development work on our platforms is complete. Going forward, we expect our ability to leverage these platforms will allow us to significantly reduce the costs to

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develop incremental functionality, while, more importantly, accelerating our time to market. Accordingly, we expect research and development expenses to decrease in 2018 in absolute dollars and as a percentage of total revenue.
2016 compared to 2015: The increase in research and development expenses during 2016 compared with 2015 was primarily due to an increase in personnel for research and development, resulting in higher compensation and employee benefits of $7.3 million, to support our growing product portfolio, strategic investments in new solutions, including next generation solutions and new customer segments and international market expansion. Expenses for outside contractors increased by $6.8 million and expenditures relating to prototype and expendable equipment used for research and development activities increased by approximately $3.8 million, primarily for development services including investments in next generation technologies to pursue broader growth opportunities.

Sales and Marketing Expenses

Sales and marketing expenses consist of personnel costs, employee sales commissions, marketing programs, software tools and travel-related expenses. The following table sets forth our sales and marketing expenses (in thousands, except for percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Sales and marketing | $82,781 | $83,675 | $78,563 | $(894) | (1)% | $5,112 | 7% |
| Percent of total revenue | 16 % | 18 % | 19 % | | | | |

2017 compared to 2016: Sales and marketing expenses decreased by $0.9 million during 2017 compared with 2016 primarily due to decreases in personnel costs of $1.7 million as headcount decreased and a decrease in stock-based compensation of $1.2 million. These decreases were partially offset by an increase in marketing expenses of $1.4 million as we invested more in ConneXions, our annual user conference, and other industry and marketing events and an increase in software tools of $0.9 million.
Sales and marketing expenses as a percentage of total revenue decreased from year to year.
We expect to continue our investments in sales and marketing in order to extend our market reach and grow our business in support of our key strategic initiatives.
2016 compared to 2015: The increase in sales and marketing expenses during 2016 compared with 2015 was primarily due to an increase in compensation and employee benefits of $3.3 million mainly attributed to higher commissions due to increased shipments. Additionally, expenses relating to marketing events, trade shows and promotional items related to marketing programs also increased by $1.0 million.

General and Administrative Expenses

General and administrative expenses consist primarily of personnel costs related to our executive, finance, human resources, information technology and legal organization, outside consulting services, insurance, allocated facilities and fees for professional services. Professional services consist of outside audit, legal, accounting and tax services. The following table sets forth our general and administrative expenses (in thousands, except for percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| General and administrative | $39,875 | $41,592 | $38,454 | $(1,717) | (4)% | $3,138 | 8% |
| Percent of total revenue | 8 % | 9 % | 9 % | | | | |

2017 compared to 2016: The decrease in general and administrative expenses during 2017 compared with 2016 included legal fees and expenses related to the Occam litigation of $6.4 million that did not recur in 2017 as the litigation was settled in 2016. The decrease was partially offset by increases in professional services of $2.5 million primarily related to outside consulting services for migrating of our on-premise enterprise resource planning infrastructure to a cloud model, compensation and employee benefits of $1.0 million, primarily due to increase in headcount and severance benefits of $0.5 million related to our separation agreement with our former Chief Financial Officer and an increase in legal expenses of $0.5 million. The increase in compensation and employee benefits includes reductions in employee bonuses of $0.7 million and stock-based compensation of $0.6 million during 2017 as compared to 2016.

Our general and administrative expenses as a percentage of total revenue remained relatively flat from year to year. We expect our general and administrative expenses to decrease as a percentage of revenue over time.

2016 compared to 2015: The increase in general and administrative expenses during 2016 compared with 2015 was primarily due to an increase in our compensation and employee benefits by $2.0 million mainly due to an increase in headcount for our support organizations. Additionally, legal fees and expenses related to defense costs in the Occam litigation that were not

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reimbursable under our Directors & Officers liability insurance or were otherwise in excess of the insurance coverage increased by $2.8 million. See “Litigation Settlement Gain” section below. The increase was partially offset by a $1.3 million decrease in consulting and contracted labor services.

Restructuring Charges

In March 2017, we adopted a restructuring plan to realign our business to increase focus on our investments in cloud and software platforms, while reducing our expense structure around our traditional systems. Under this plan, we incurred restructuring charges of $4.2 million for the year ended December 31, 2017, consisting primarily of severance and other termination related benefits. Actions under this plan were complete as of December 31, 2017. Any changes to the estimates of executing the restructuring plan will be reflected in our future results of operations.

Amortization of Intangible Assets

The intangible asset related to customer relationships had reached completion of its amortization period during the first quarter of 2016.

Litigation Settlement Gain

During 2016, we recognized a litigation settlement gain of $4.5 million as a reduction to operating expenses. This litigation settlement gain consisted of a litigation settlement accrual of $4.5 million as a partial recovery of out-of-pocket costs related to the Occam litigation. Please refer to Note 7, “Commitments and Contingencies – Litigation” of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

Interest and Other Income (Expense), Net

The following table sets forth our interest and other income (expense), net (in thousands, except for percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Interest and other income (expense), net | $(233) | $1,064 | $712 | $(1,297) | (122)% | $352 | 49% |

2017 compared to 2016: The decrease in interest and other income (expense), net during 2017 compared with 2016 is primarily due to a reduction in interest income resulting from lower levels of marketable securities investments in 2017, an increase in interest expense resulting from initiating line of credit borrowings in 2017 and a decrease in foreign currency gain (loss).

2016 compared to 2015: The fluctuations in interest and other income (expense), net were primarily due to the level of cash and investment balances during the periods presented, partially offset by the fluctuations in interest expense during those respective periods primarily attributed to amortization of premiums relating to available-for-sale securities.

Provision for Income Taxes

The provisions for income taxes primarily consist of state and foreign income taxes. The following table sets forth our provision for income taxes (in thousands, except percentages):

| | Years Ended December 31, | | | 2017 vs 2016 Change | | 2016 vs 2015 Change | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2016 | 2015 | $ | % | $ | % |
| Provision for income taxes | $1,243 | $347 | $535 | $896 | 258% | $(188) | (35)% |
| Effective tax rate | (1.5)% | (1.3)% | (2.1)% | | | | |

2017 compared to 2016: Income tax expense increased by $0.9 million from $0.3 million in 2016 to $1.2 million in 2017. The increase was primarily due to the write-off of a foreign entity’s deferred tax assets in 2017.

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act, or the Tax Act. The significant impacts from the Tax Act include a net, one-time transition tax of $1.1 million on unrepatriated earnings of foreign subsidiaries, which was offset by our current net operating loss, as well as tax expense of $84.4 million related to the revaluation of our deferred tax assets and liabilities due to the reduction of the U.S. corporate tax rate from 34% to 21%, which was offset by a reduction in our valuation allowance.

As of December 31, 2017, we had unrecognized tax benefits of $20.3 million, none of which would affect our effective tax rate if recognized.

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2016 compared to 2015: Income tax expense decreased by $0.2 million from $0.5 million in 2015 to $0.3 million in 2016. The decrease was primarily due to the reversal of a foreign entity's deferred tax assets valuation allowance.
As of December 31, 2016, we had unrecognized tax benefits of $18.3 million, none of which would affect our effective tax rate if recognized.

Liquidity and Capital Resources

We have funded our operations and investing activities primarily through cash generated from operations, borrowing on our line of credit and sales of our common stock. At December 31, 2017, we had cash and cash equivalents of $39.8 million, which consisted of deposits held at banks and money market mutual funds held at major financial institutions. This includes $2.9 million of cash held by our foreign subsidiaries primarily in China. As of December 31, 2017, our liability for taxes that would be payable as a result of repatriation of undistributed earnings of our foreign subsidiaries to the United States was not significant and limited to withholding taxes considering our existing net operating loss carryovers.

The following table presents the cash inflows and outflows by activity during 2017, 2016 and 2015 (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Net cash provided by (used in) operating activities | $(62,772) | $24,419 | $(5,341) |
| Net cash provided by investing activities | 19,734 | 12,083 | 4,665 |
| Net cash provided by (used in) financing activities | 31,990 | (9,243) | (24,141) |

Operating Activities

Our operating activities used cash of $62.8 million in 2017, provided cash of $24.4 million in 2016 and used cash of $5.3 million in 2015. The increase in net cash used in operating activities during 2017 as compared to 2016 was due primarily to an unfavorable change of $60.8 million in our operating results after adjustment of non-cash charges and a $26.4 million decrease in net cash inflow resulting from changes in operating assets and liabilities. In 2017, cash used in operating activities increased as we continued to invest in research and development to pursue broader market and customer opportunities. Furthermore, during this period we continued to experience losses due to higher costs, delays, overruns and other inefficiencies associated with our professional services business for turnkey network improvement projects (including CAF projects). As described below, these turnkey network improvement projects generally involve greater working capital needs at the outset as services and products are supplied, while revenue and cash collections occur after projects are accepted or agreed-upon milestones are reached.

In 2017, cash outflows from changes in operating assets and liabilities primarily consisted of an increase in net accounts receivable of $29.1 million, mainly due to the delayed payments by a large customer until early January 2018, and a decrease in accrued liabilities of $20.2 million primarily due to a decrease in customer advance payments for turnkey services projects for one of our customers and partly due to the timing of our payments of payroll, sales commissions and other expenses. Cash outflows from changes in operating assets and liabilities primarily consisted of a decrease in deferred cost of revenue of $32.4 million, partly offset by a decrease in deferred revenue of $14.4 million mainly due to recognition of associated costs related to turnkey network improvement projects that are either accepted or for which agreed-upon milestones are reached, a decrease in inventory of $13.0 million due to higher inventory turnover, an increase in accounts payable of $11.8 million primarily due to the timing of inventory receipts and payments to our contract manufacturers and a decrease in prepaid expenses and other assets of $2.8 million.
Non-cash charges were $23.6 million, the majority of which consist of stock-based compensation expense, amortization expenses and depreciation.

The increase in net cash provided by operating activities during 2016 as compared to 2015 was due primarily to a $45.6 million increase in net cash inflow resulting from changes in operating assets and liabilities, partially offset by unfavorable change of $15.8 million in our operating results after adjustment of non-cash charges. In 2016, cash inflows from changes in operating assets and liabilities primarily consisted of an increase in accrued liabilities of $34.9 million primarily due to customer advance payments for certain turnkey projects, and due to the timing of our payroll, sales commissions and other expenses accruals and payout, an increase in accounts payable of $4.2 million primarily due to the timing of inventory receipts and payments to our contract manufacturers and a decrease in inventory of $3.1 million due to higher inventory turnover. Cash outflows from changes in operating assets and liabilities primarily consisted of a net decrease in deferred revenue and deferred cost of revenue of $13.4 million as a result of revenue and cost recognition for previous shipments related to certain turnkey projects and RUS-funded contracts, an increase in net accounts receivable of $4.2 million due to higher revenue in 2016, an increase in prepaid expenses and other assets of $1.2 million and a decrease in other long-term liabilities of $0.4 million. Non-cash charges were $28.8 million, the majority of which consist of stock-based compensation expense, amortization expenses and depreciation.

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Investing Activities

In 2017, net cash provided by investing activities of $19.7 million consisted of net sales and maturities of marketable securities of $27.8 million partially offset by capital expenditures of $8.0 million for purchases of test equipment, computer equipment and software.

In 2016, our net cash provided by investing activities of $12.1 million consisted of net maturities of marketable securities of $21.9 million, partially offset by capital expenditures of $9.8 million for purchases of test equipment, computer equipment and software.

In 2015, our net cash provided by investing activities of $4.7 million consisted of net maturities of marketable securities of $11.9 million, partially offset by capital expenditures of $7.3 million for purchases of test equipment, computer equipment and software.

Financing Activities

In 2017, net cash provided by financing activities of $32.0 million primarily consisted of net proceeds from our line of credit of $30.0 million and the proceeds from the issuance of common stock under our employee stock purchase plans of $4.9 million, partially offset by the payment of payroll taxes for the vesting of awards under our 2010 Equity Incentive Award Plan of $2.8 million and payments to originate our line of credit with SVB of $0.2 million.

In 2016, net cash used in financing activities of $9.2 million consisted of the repurchases of common stock of $12.8 million and the payment of payroll taxes for the vesting of awards under our 2010 Equity Incentive Award Plan of $2.1 million, partially offset by the proceeds from the issuance of common stock under our ESPP of $5.7 million.

In 2015, net cash used in financing activities of $24.1 million consisted of the repurchases of common stock of $27.2 million, the payment of payroll taxes for the vesting of awards under our 2010 Equity Incentive Award Plan of $2.4 million and payments to originate an extension of the line of credit then in place with Bank of America of $0.1 million, partially offset by the proceeds from the issuance of common stock under our ESPP of $4.9 million and the proceeds from the exercises of stock options of $0.6 million.

Stock Repurchase Program

On April 26, 2015, our Board of Directors approved a program to repurchase up to $40 million of our common stock from time to time. This stock repurchase program commenced in May 2015 and concluded in March 2016. During the year ended December 31, 2015, we repurchased 3,540,530 shares of common stock for $27.2 million at an average price of $7.68 per share. During the year ended December 31, 2016, we repurchased a total of 1,789,287 shares of common stock for $12.8 million at an average price of $7.16 per share.

Working Capital and Capital Expenditure Needs

We currently have no material cash commitments, except for contractual obligations under our Loan Agreement, normal recurring trade payables, expense accruals, operating leases and non-cancelable firm purchase commitments. Our working capital needs related to turnkey network improvement arrangements have been substantial, as under such arrangements we generally purchase substantial equipment, components and materials and pay our subcontractors at the outset and through the course of a project, but we may not receive payment from our customers until completion and acceptance of the associated services, which may be one or more quarters later. We expect our working capital needs related to turnkey network improvement projects, including CAF projects, to decrease significantly as we have completed the vast majority of such projects as of December 31, 2017 and expect the volume of such projects to be lower in 2018 relative to 2017. We believe that our outsourced approach to manufacturing provides us significant flexibility in both managing inventory levels and financing our inventory. In the event that our revenue plan does not meet our expectations, we may eliminate or curtail expenditures to mitigate the impact on our working capital.

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In August 2017, we entered into the Loan Agreement for a senior secured revolving credit facility with SVB, which provides for a revolving credit facility of up to $30.0 million based on a customary accounts receivable borrowing base, subject to certain exceptions for accounts originating outside the United States and certain specific accounts, which could reduce the amount available to us under the credit facility. The Loan Agreement includes affirmative and negative covenants and requires us to maintain a liquidity ratio at minimum levels specified in the Loan Agreement. The credit facility matures, and all outstanding amounts become due and payable, on August 7, 2019. For the month ended November 30, 2017, we were not able to maintain the minimum Adjusted Quick Ratio (as defined in the Loan Agreement) at the level required in the Loan Agreement, which constituted an event of default. Although SVB waived this event of default effective as of November 30, 2017 and, therefore, this default did not change our ability to borrow under the Loan Agreement, we were required to amend certain covenants under the Loan Agreement and, in February 2018, we entered into an amendment to the Loan Agreement that, among other things, amended certain affirmative financial covenants, including reductions to the required minimum level of the Adjusted Quick Ratio (as defined in the Loan Agreement) and the inclusion of an additional financial covenant related to the maintenance of Adjusted EBITDA (as defined in the Loan Agreement). As of December 31, 2017, our Adjusted Quick Ratio was 1.05 as compared to the requirement of 0.925. As of December 31, 2017, we had borrowings of $30.0 million under this line of credit. For a detailed discussion of our credit facility, please refer to Note 6, “Credit Facility” of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

In addition to the restructuring plan adopted in March 2017 as discussed above, we established a new restructuring plan in early 2018 to further realign our business resources based on the production releases of our platform offerings. We expect to incur restructuring charges of approximately $4.0 million, consisting of primarily of severance and other termination related benefits, in the first quarter of 2018. These actions are expected to result in annualized savings of over $16.0 million.

In February 2018, we sold our outdoor cabinet product line to Clearfield, Inc. for $10.4 million in cash and the assumption by Clearfield of the related product warranty liabilities and open purchase order commitments with our contract manufacturer. We believe the divestiture of this non-strategic product line reflects our strategic focus on our platforms. We expect the proceeds from this sale will be used to continue our execution on our business strategy. See Note 15, “Subsequent Events” of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K.

We believe, based on our current operating plan and expected operating cash flows, that our existing cash, cash equivalents and marketable securities, along with available borrowings under our SBV line of credit, will be sufficient to meet our anticipated cash needs for at least the next twelve months. We expect that we may from time to time draw on the SVB line of credit to support our working capital needs. Our future capital requirements will depend on many factors including our rate of revenue growth, timing of customer payments and payment terms, particularly of larger customers, the timing and extent of spending to support development efforts, particularly research and development related to growth initiatives such as our software defined access portfolio, our ability to partner with third parties to outsource our research and development projects, our ability to manage product cost efficiencies and maintain product margin levels, the timing, extent and size of turnkey professional services projects and our ability to develop operational efficiencies and successfully scale that business, the expansion of sales and marketing activities, the timing of introductions of new products and enhancements to existing products, the acquisition of new capabilities or technologies and the continued market acceptance of our products. If we are unable to execute to our current operating plan or generate positive operating income and positive cash flows, our liquidity, results of operations and financial condition will be adversely affected. We may need to seek other sources of liquidity, including the sale of equity or incremental borrowings, to support our working capital needs. In addition, we may choose to seek other sources of liquidity even if we believe we have generated sufficient cash flows to support our operational needs. There is no assurance that any other sources of liquidity may be available to us on acceptable terms or at all. If we are unable to generate sufficient cash flows or obtain other sources of liquidity, we will be forced to limit our development activities, reduce our investment in growth initiatives and institute cost-cutting measures, all of which may adversely impact our business and growth.

Contractual Obligations and Commitments

Our principal commitments as of December 31, 2017 consisted of our contractual obligations under the Loan Agreement, operating leases for office space and non-cancelable outstanding purchase obligations. The following table summarizes our contractual obligations at December 31, 2017 (in thousands):

| | Payments Due by Period | | | | |
|---|---|---|---|---|---|
| | Total | Less Than 1 Year | 1-3 Years | 3-5 Years | More Than 5 Years |
| Line of credit, including interest [1] | $32,760 | $31,725 | $1,035 | $ — | $ — |
| Operating lease obligations [2] | 4,956 | 2,805 | 1,845 | 306 | — |
| Non-cancelable purchase commitments [3] | 60,505 | 60,505 | — | — | — |
| Total | $98,221 | $95,035 | $2,880 | $ 306 | $ — |

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(1) Line of credit contractual obligations include projected interest payments over the term of the Loan Agreement, assuming interest rate in effect for the outstanding borrowings as of December 31, 2017 and as if the entire line of credit will be outstanding during the term. The line of credit borrowings are reflected as due in less than one year based on the liquidity ratio conditions in the Loan Agreement that, as of December 31, 2017, required us to apply cash collections to the line of credit, following which we may make additional draws based on the applicable borrowing base.

(2) Future minimum operating lease obligations in the table above include primarily payments for our office space in Petaluma, California, and for our facilities in Minneapolis, Minnesota; Nanjing, China; Richardson, Texas; and San Jose and Santa Barbara, California, which expire at various dates through 2022. See Note 7, "Commitments and Contingencies" of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for further discussion regarding our operating leases.

(3) Represents outstanding purchase commitments for inventory and component parts to be delivered by our suppliers, including contract manufacturers, ODMs and/or other manufacturing partners. See Note 7, "Commitments and Contingencies" of Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for further discussion regarding our outstanding purchase commitments.

## Off-Balance Sheet Arrangements

As of December 31, 2017 and 2016, we did not have any off-balance sheet arrangements.

# ITEM 7A. Quantitative and Qualitative Disclosures About Market Risk

## Interest Rate Risk

The primary objectives of our investment activity are to preserve principal, provide liquidity and maximize income without significantly increasing risk. By policy, we do not enter into investments for trading or speculative purposes. At December 31, 2017, we had cash and cash equivalents of $39.8 million, which were held primarily in cash and money market funds. Due to the nature of these money market funds, we believe that we do not have any material exposure to changes in the fair value of our cash equivalents as a result of changes in interest rates.

Our exposure to interest rate risk also relates to the amount of interest we must pay on our borrowings under our revolving credit facility pursuant to our Loan Agreement with SVB. Borrowings under the Loan Agreement will bear interest through maturity at a variable annual rate based upon an annual rate of either a prime rate or a LIBOR rate, plus an applicable margin between 0.50% to 1.50% for prime rate advances and between 2.00% and 3.00% for LIBOR advances based on the Company's maintenance of an applicable liquidity ratio. As of December 31, 2017, we had $30.0 million outstanding in borrowings under the Loan Agreement.

## Foreign Currency Exchange Risk

Our primary foreign currency exposures are described below.

### Economic Exposure

The direct effect of foreign currency fluctuations on our sales and expenses has not been material because our sales and expenses are primarily denominated in U.S. dollars, or USD. However, we are indirectly exposed to changes in foreign currency exchange rates to the extent of our use of foreign contract manufacturers whom we pay in USD. Increases in the local currency rates of these vendors in relation to USD could cause an increase in the price of products that we purchase. Additionally, if the USD strengthens relative to other currencies, such strengthening could have an indirect effect on our sales to the extent it raises the cost of our products to non-U.S. customers and thereby reduces demand. A weaker USD could have the opposite effect. The precise indirect effect of currency fluctuations is difficult to measure or predict because our sales are influenced by many factors in addition to the impact of such currency fluctuations.

### Translation Exposure

Our sales contracts are primarily denominated in USD and, therefore, the majority of our revenue is not subject to foreign currency risk. We are directly exposed to changes in foreign exchange rates to the extent such changes affect our expenses related to our foreign assets and liabilities with our subsidiaries in Brazil, China and the United Kingdom, whose functional currencies are the Brazilian Real, or BRL, Chinese Renminbi, or RMB, and British Pounds Sterling, or GBP, respectively.

Our operating expenses are incurred primarily in the United States, with a small portion of expenses incurred in Brazil associated with the administration of the entity, in China associated with our research and development operations that are maintained there, and in the United Kingdom for our international sales and marketing activities. Our operating expenses are generally denominated in the functional currencies of our subsidiaries in which the operations are located. The percentages of our operating expenses denominated in the following currencies for the indicated fiscal years were as follows:

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| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| USD | 89 % | 88 % | 89 % |
| RMB | 7 % | 7 % | 5 % |
| GBP | 3 % | 4 % | 5 % |
| BRL | 1 % | 1 % | 1 % |
| | 100% | 100% | 100% |

If the currency exchange rates in 2017 had been the same as in 2016, our 2017 operating expenses would have increased by approximately $0.8 million. If the U.S. dollar had appreciated or depreciated by 10% relative to RMB, GBP and BRL, our operating expenses for 2017 would have decreased or increased by $2.8 million, or approximately 1%. We do not currently enter into forward exchange contracts to hedge exposure denominated in foreign currencies or any derivative financial instruments. In the future, we may consider entering into hedging transactions to help mitigate our foreign currency exchange risk.

Foreign exchange rate fluctuations may also adversely impact our financial position as the assets and liabilities of our foreign operations are translated into USD in preparing our Consolidated Balance Sheets. The effect of foreign exchange rate fluctuations on our consolidated financial position for the year ended December 31, 2017 was a net translation gain of approximately $0.5 million. This gain is recognized as an adjustment to stockholders' equity through accumulated other comprehensive loss.

Transaction Exposure

We have certain assets and liabilities, primarily receivables and accounts payable (including inter-company transactions) that are denominated in currencies other than the relevant entity's functional currency. In certain circumstances, changes in the functional currency value of these assets and liabilities create fluctuations in our reported consolidated financial position, cash flows and results of operations. Transaction gains and losses on these foreign currency denominated assets and liabilities are recognized each period within other income (expense), net in our Consolidated Statements of Comprehensive Loss. During the year ended December 31, 2017, we recognized a net loss related to these foreign exchange assets and liabilities of approximately $0.4 million.

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ITEM 8. Financial Statements and Supplementary Data

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Report of Independent Registered Public Accounting Firm
The Board of Directors and Stockholders
Calix, Inc.:

Opinions on the Consolidated Financial Statements and Internal Control Over Financial Reporting

We have audited the accompanying consolidated balance sheets of Calix, Inc. and subsidiaries (the Company) as of December 31, 2017 and 2016, the related consolidated statements of comprehensive loss, stockholders' equity, and cash flows for each of the years in the two-year period ended December 31, 2017, and the related notes (collectively, 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.

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 years in the two-year period ended December 31, 2017, in conformity with U.S. generally accepted accounting principles. 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 Committee of Sponsoring Organizations of the Treadway Commission.

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 Item 9A, Controls and Procedures. Our responsibility is to express an opinion on the Company's consolidated financial statements and an opinion 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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ KPMG LLP

We have served as the Company's auditor since 2016.

San Francisco, California

March 13, 2018

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Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders of Calix, Inc.

We have audited the accompanying consolidated statements of comprehensive loss, stockholders' equity and cash flows for the year ended December 31, 2015. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated results of Calix, Inc.'s operations and its cash flows for the year ended December 31, 2015, in conformity with U.S. generally accepted accounting principles.

/s/ Ernst & Young LLP
San Jose, California
February 25, 2016, except as to Note 2, which is as of March 13, 2018.

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CALIX, INC.
CONSOLIDATED BALANCE SHEETS
(In thousands, except par value)

| | December 31, 2017 | December 31, 2016 |
|---|---|---|
| ASSETS | | |
| Current assets: | | |
| Cash and cash equivalents | $39,775 | $50,359 |
| Marketable securities | — | 27,748 |
| Accounts receivable, net | 80,392 | 51,336 |
| Inventory | 31,529 | 44,545 |
| Deferred cost of revenue | 2,395 | 34,763 |
| Prepaid expenses and other current assets | 8,364 | 10,571 |
| Total current assets | 162,455 | 219,322 |
| Property and equipment, net | 15,681 | 17,984 |
| Goodwill | 116,175 | 116,175 |
| Other assets | 759 | 1,994 |
| | $295,070 | $355,475 |
| LIABILITIES AND STOCKHOLDERS' EQUITY | | |
| Current liabilities: | | |
| Accounts payable | $35,977 | $23,827 |
| Accrued liabilities | 49,279 | 69,715 |
| Deferred revenue | 13,076 | 27,854 |
| Line of credit | 30,000 | — |
| Total current liabilities | 128,332 | 121,396 |
| Long-term portion of deferred revenue | 20,645 | 20,237 |
| Other long-term liabilities | 1,130 | 878 |
| Total liabilities | 150,107 | 142,511 |
| Commitments and contingencies (See Note 7) | | |
| Stockholders' equity: | | |
| Preferred stock, $0.025 par value; 5,000 shares authorized; no shares issued and outstanding as of December 31, 2017 and December 31, 2016 | — | — |
| Common stock, $0.025 par value; 100,000 shares authorized; 56,839 shares issued and 51,509 shares outstanding as of December 31, 2017, and 54,722 shares issued and 49,392 shares outstanding as of December 31, 2016 | 1,421 | 1,368 |
| Additional paid-in capital | 851,054 | 836,563 |
| Accumulated other comprehensive loss | (169) | (656) |
| Accumulated deficit | (667,357) | (584,325) |
| Treasury stock, 5,330 shares as of December 31, 2017 and December 31, 2016 | (39,986) | (39,986) |
| Total stockholders' equity | 144,963 | 212,964 |
| | $295,070 | $355,475 |

See accompanying notes to consolidated financial statements.

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CALIX, INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands, except per share data)

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Revenue: | | | |
| Products | $421,890 | $428,584 | $385,679 |
| Services | 88,477 | 30,203 | 21,784 |
| Total revenue | 510,367 | 458,787 | 407,463 |
| Cost of revenue: | | | |
| Products (1) | 236,137 | 228,976 | 204,726 |
| Services (1) | 101,340 | 28,593 | 12,308 |
| Total cost of revenue | 337,477 | 257,569 | 217,034 |
| Gross profit | 172,890 | 201,218 | 190,429 |
| Operating expenses: | | | |
| Research and development (1) | 127,541 | 106,869 | 89,714 |
| Sales and marketing (1) | 82,781 | 83,675 | 78,563 |
| General and administrative (1) | 39,875 | 41,592 | 38,454 |
| Restructuring charges | 4,249 | — | — |
| Amortization of intangible assets | — | 1,701 | 10,208 |
| Litigation settlement gain | — | (4,500) | — |
| Total operating expenses | 254,446 | 229,337 | 216,939 |
| Loss from operations | (81,556) | (28,119) | (26,510) |
| Interest and other income (expense), net: | | | |
| Interest income (expense), net | (160) | 152 | 141 |
| Other income (expense), net | (73) | 912 | 571 |
| Total interest and other income (expense), net | (233) | 1,064 | 712 |
| Loss before provision for income taxes | (81,789) | (27,055) | (25,798) |
| Provision for income taxes | 1,243 | 347 | 535 |
| Net loss | $(83,032) | $(27,402) | $(26,333) |
| Net loss per common share: | | | |
| Basic and diluted | $(1.66) | $(0.56) | $(0.51) |
| Weighted-average number of shares used to compute net loss per common share: | | | |
| Basic and diluted | 50,155 | 48,730 | 51,489 |
| | | | |
| Net loss | $(83,032) | $(27,402) | $(26,333) |
| Other comprehensive income (loss), net of tax: | | | |
| Unrealized gain (loss) on available-for-sale marketable securities, net | 6 | 88 | (36) |
| Foreign currency translation adjustments, net | 481 | (549) | (239) |
| Total other comprehensive income (loss), net of tax | 487 | (461) | (275) |
| Comprehensive loss | $(82,545) | $(27,863) | $(26,608) |

(1) Includes stock-based compensation as follows:

| | | | |
|---|---|---|---|
| Cost of revenue: | | | |
| Products | $473 | $465 | $595 |
| Services | 276 | 207 | 114 |
| Research and development | 4,869 | 5,125 | 4,797 |

| | | | |
|---|---|---|---|
| Sales and marketing | 3,433 | 4,586 | 4,712 |
| General and administrative | 3,317 | 3,902 | 3,587 |

See accompanying notes to consolidated financial statements.

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

| | Common Stock Shares | Common Stock Amount | Additional Paid-in Capital | Accumulated Other Comprehensive Income (Loss) | Accumulated Deficit | Treasury Stock | Total Stockholders' Equity |
|---|---|---|---|---|---|---|---|
| Balance at December 31, 2014 | 51,628 | $ 1,291 | $ 801,810 | $ 80 | $ (530,590) | $ — | $ 272,591 |
| Stock-based compensation | — | — | 13,805 | — | — | — | 13,805 |
| Exercise of stock options | 97 | 2 | 636 | — | — | — | 638 |
| Issuance of vested performance restricted stock units and restricted stock units, net of taxes withheld | 583 | 14 | (2,206) | — | — | — | (2,192) |
| Stock issued under employee stock purchase plan | 762 | 19 | 4,869 | — | — | — | 4,888 |
| Shares withheld for taxes for vested restricted stock awards | (20) | — | (160) | — | — | — | (160) |
| Net loss | — | — | — | — | (26,333) | — | (26,333) |
| Other comprehensive loss | — | — | — | (275) | — | — | (275) |
| Repurchases of common stock | (3,541) | — | — | — | — | (27,177) | (27,177) |
| Balance at December 31, 2015 | 49,509 | 1,326 | 818,754 | (195) | (556,923) | (27,177) | 235,785 |
| Stock-based compensation | — | — | 14,285 | — | — | — | 14,285 |
| Exercise of stock options | 3 | — | 17 | — | — | — | 17 |
| Issuance of vested performance restricted stock units and restricted stock units, net of taxes withheld | 659 | 17 | (2,118) | — | — | — | (2,101) |
| Stock issued under employee stock purchase plan | 1,010 | 25 | 5,625 | — | — | — | 5,650 |
| Net loss | — | — | — | — | (27,402) | — | (27,402) |
| Other comprehensive loss | — | — | — | (461) | — | — | (461) |
| Repurchases of common stock | (1,789) | — | — | — | — | (12,809) | (12,809) |
| Balance at December 31, 2016 | 49,392 | 1,368 | 836,563 | (656) | (584,325) | (39,986) | 212,964 |
| Stock-based compensation | — | — | 12,368 | — | — | — | 12,368 |
| Exercise of stock options | 11 | — | 62 | — | — | — | 62 |
| Issuance of vested performance restricted stock units and restricted stock units, net of taxes withheld | 994 | 24 | (2,788) | — | — | — | (2,764) |
| Stock issued under employee stock purchase plans | 1,112 | 29 | 4,849 | — | — | — | 4,878 |
| Net loss | — | — | — | — | (83,032) | — | (83,032) |
| Other comprehensive income | — | — | — | 487 | — | — | 487 |
| Balance at December 31, 2017 | 51,509 | $ 1,421 | $ 851,054 | $ (169) | $ (667,357) | $ (39,986) | $ 144,963 |

See accompanying notes to consolidated financial statements.

CALIX, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Operating activities: | | | |
| Net loss | $(83,032) | $(27,402) | $(26,333) |
| Adjustments to reconcile net loss to net cash provided by (used in) operating activities: | | | |
| Stock-based compensation | 12,368 | 14,285 | 13,805 |
| Depreciation and amortization | 10,178 | 8,319 | 10,262 |
| Amortization of intangible assets | 813 | 5,805 | 18,561 |
| Loss on retirement of property and equipment | 280 | — | 24 |
| Amortization of premium (discount) relating to available-for-sale securities | (6) | 382 | 907 |
| Changes in operating assets and liabilities: | | | |
| Restricted cash | — | — | 295 |
| Accounts receivable, net | (29,056) | (4,185) | (16,411) |
| Inventory | 13,016 | 3,122 | (915) |
| Deferred cost of revenue | 32,368 | (29,845) | 162 |
| Prepaid expenses and other assets | 2,842 | (1,197) | 2,889 |
| Accounts payable | 11,759 | 4,236 | (4,021) |
| Accrued liabilities | (20,184) | 34,913 | (3,781) |
| Deferred revenue | (14,370) | 16,398 | (422) |
| Other long-term liabilities | 252 | (412) | (363) |
| Net cash provided by (used in) operating activities | (62,772) | 24,419 | (5,341) |
| Investing activities: | | | |
| Purchases of property and equipment | (8,026) | (9,839) | (7,278) |
| Purchases of marketable securities | (8,732) | (16,478) | (60,002) |
| Sales of marketable securities | 5,051 | — | — |
| Maturities of marketable securities | 31,441 | 38,400 | 71,945 |
| Net cash provided by investing activities | 19,734 | 12,083 | 4,665 |
| Financing activities: | | | |
| Proceeds from exercise of stock options | 62 | 17 | 638 |
| Proceeds from employee stock purchase plans | 4,878 | 5,650 | 4,888 |
| Payments for repurchases of common stock | — | (12,809) | (27,177) |
| Taxes paid for awards vested under equity incentive plan | (2,764) | (2,101) | (2,352) |
| Proceeds from line of credit | 171,268 | — | — |
| Repayments of line of credit | (141,268) | — | — |
| Payments to originate the line of credit | (186) | — | (138) |
| Net cash provided by (used in) financing activities | 31,990 | (9,243) | (24,141) |
| Effect of exchange rate changes on cash and cash equivalents | 464 | (526) | (386) |
| Net increase (decrease) in cash and cash equivalents | (10,584) | 26,733 | (25,203) |
| Cash and cash equivalents at beginning of year | 50,359 | 23,626 | 48,829 |
| Cash and cash equivalents at end of year | $39,775 | $50,359 | $23,626 |
| Supplemental disclosures of cash flow information: | | | |
| Interest paid | $313 | $127 | $127 |
| Income taxes paid | 915 | 965 | 483 |
| Non-cash investing activities: | | | |
| | $(55) | $(478) | $— |

Changes in accounts payable and accrued liabilities related to purchases of property and equipment

See accompanying notes to consolidated financial statements.

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CALIX, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
1. Description of Business and Significant Accounting Policies
Company
Calix, Inc. (together with its subsidiaries, “Calix” or the “Company”) was incorporated in August 1999, and is a Delaware corporation. The Company is a leading global provider of the cloud and software platforms, systems and services required to deliver the unified access network and smart premises of tomorrow. The Company’s platforms and services help its customers build next generation networks by embracing a DevOps operating model, optimize the subscriber experience by leveraging big data analytics and turn the complexity of the smart home and business into new revenue streams. The Company's cloud and software platforms, systems and services enable communication service providers (“CSPs”) to provide a wide range of revenue-generating services, from basic voice and data to advanced broadband services, over legacy and next-generation access networks. The Company focuses on CSP access networks, the portion of the network that governs available bandwidth and determines the range and quality of services that can be offered to subscribers.
Basis of Presentation
The accompanying consolidated financial statements, including the accounts of Calix, Inc. and its wholly owned subsidiaries, have been prepared in accordance with the requirements of the U.S. Securities and Exchange Commission (“SEC”). In the opinion of management, the consolidated financial statements include all normal and recurring adjustments that are considered necessary for the fair presentation of the Company’s financial position and operating results. All significant intercompany balances and transactions have been eliminated in consolidation.
Liquidity and Capital Resources
Since its inception, the Company has incurred significant losses, and as of December 31, 2017, the Company had an accumulated deficit of $667.4 million. Based on its current operating plan and operating cash flows, management plans to finance its future operations and capital expenditures with existing cash and cash equivalents, which it believes will be sufficient to fund its operations and capital expenditures through at least the next twelve months. In addition, the Company may use its existing $30.0 million credit facility from time to time to support its working capital needs. The Company may also need to seek other sources of liquidity, including the sale of equity or incremental borrowings, to support its working capital needs. However, there can be no assurances that such capital will be available on terms which are acceptable to the Company or at all or that the Company will achieve profitable operations. If the Company is unable to generate sufficient cash flows or obtain other sources of liquidity, the Company will be forced to limit its development activities, reduce its investment in growth initiatives and institute cost-cutting measures, all of which may adversely impact the Company’s business and growth. The accompanying consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.
Applicable Accounting Guidance
Any reference in these notes to applicable accounting guidance (“guidance”), is meant to refer to the authoritative U.S. generally accepted accounting principles (“GAAP”) as found in the Financial Accounting Standards Board (“FASB”) Accounting Standards Codification (“ASC”).
Use of Estimates
The preparation of financial statements is in conformity with U.S. GAAP, which requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. For the Company, these estimates include, but are not limited to: allowances for doubtful accounts and sales returns, excess and obsolete inventory, allowances for obligations to its contract manufacturers, valuation of stock-based compensation, useful lives assigned to long-lived assets and acquired intangible assets, standard and extended warranty costs, and contingencies. Actual results could differ from those estimates, and such differences could be material to the Company’s financial position and results of operations.
Revenue Recognition
The Company derives revenue primarily from the sale of access and premises systems, services and cloud and software platforms. Revenue is recognized when all of the following criteria have been met:

- Persuasive evidence of an arrangement exists. The Company generally relies upon sales agreements and customer purchase orders as evidence of an arrangement.

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- Delivery has occurred. The Company uses the shipping terms of the arrangement or evidence of customer acceptance to verify delivery or performance.
- Sales price is fixed or determinable. The Company assesses whether the sales price is fixed or determinable based on the payment terms and whether the sales price is subject to refund or adjustment. Payment terms to customers can range from net 30 to net 180 days.
- Collectability is reasonably assured. The Company assesses collectability based primarily on creditworthiness of customers and their payment histories.

Revenue from installation and training services is recognized as the services are completed. Post-sales software support revenue and extended warranty services revenue are deferred and recognized ratably over the period during which the services are to be performed. In instances where substantive acceptance provisions are specified in the customer agreement, revenue is deferred until acceptance criteria have been met. From time to time, the Company offers customers sales incentives, which include volume rebates and discounts. These amounts are estimated on a quarterly basis and recorded as a reduction of revenue.

The Company enters into arrangements with certain of its customers who receive government supported loans and grants from the U.S. Department of Agriculture's Rural Utility Service ("RUS") to finance capital spending. Under the terms of an RUS equipment contract that includes installation services, the customer does not take possession and control and title does not pass until formal acceptance is obtained from the customer. Under this type of arrangement, the Company does not recognize revenue until it has received formal acceptance from the customer. For RUS arrangements that do not involve installation services, the Company recognizes revenue when all of the revenue recognition criteria as described above have been met.

The Company's products contain both software and non-software components that function together to deliver the products' essential functionality. When the Company enters into sales arrangements that consist of multiple deliverables of its product and service offerings, the Company allocates the total consideration of the arrangement to each separable deliverable based on its relative selling price. The Company limits the amount allocable to delivered elements to the amount that is not contingent upon the delivery of additional items or meeting specified performance conditions, and recognizes revenue on each deliverable in accordance with its revenue recognition policy. The determination of selling price for each deliverable is based on a selling price hierarchy, which is vendor-specific objective evidence ("VSOE") if available, third-party evidence ("TPE") if VSOE is not available or estimated selling price ("ESP") if neither VSOE nor TPE is available. VSOE of selling price is based on the price charged when the element is sold separately. In determining VSOE, the Company requires that a substantial majority of the selling prices of an element fall within a narrow range when each element is sold separately. The Company has established VSOE for its training and post-sales software support services based on the normal pricing practices of these services when sold separately. TPE of selling price is established by evaluating whether there are similar competitor products or services that are sold in stand-alone sales transaction to similarly situated customers. Generally, the Company's marketing strategy differs from that of its peers and its offerings contain a significant level of customization and differentiation such that the comparable pricing of products with similar functionality cannot be obtained. Additionally, as the Company is unable to reliably determine what similar competitor products' selling prices are on a stand-alone basis, it is not typically able to determine TPE. ESP is established considering multiple factors including, but not limited to, geographies market conditions, competitive landscape, internal costs, gross margin objectives, characteristics of targeted customers and pricing practices. The determination of ESP is made through consultation with and formal approval by management, taking into consideration the go-to-market strategy.

Cost of Revenue

Cost of revenue consists primarily of finished goods inventory purchased from the Company's contract manufacturers, payroll and related expenses associated with managing the relationships with contract manufacturers, depreciation of manufacturing test equipment, warranty and retrofit costs, excess and obsolete inventory costs, shipping charges and amortization of certain intangible assets. It also includes contractor and other costs of services incurred directly related to the delivery of services to customers.

Warranty and Retrofit

The Company offers limited warranties for its hardware products for a period of one, three or five years, depending on the product type. The Company recognizes estimated costs related to warranty activities as a component of cost of revenue upon product shipment or upon identification of a specific product failure. Under certain circumstances, the Company also provides fixes on specifically identified performance failures for products that are outside of the standard warranty period and recognizes estimated costs related to retrofit activities as a component of cost of revenue upon identification of such product failures. The Company recognizes estimated warranty and retrofit costs when it is probable that a liability has been incurred and the amount of loss is reasonably estimable. The estimates are based upon historical and projected product failure and claim rates, historical costs incurred in correcting product failures and information available related to any specifically identified product failures. Significant judgment is required in estimating costs associated with warranty and retrofit activities and the Company estimates are limited to information available to the Company at the time of such estimates. In some cases, such as when a specific product failure is first identified or a new product is introduced, the Company may initially have limited information and limited historical failure and claim rates upon which to base its estimates, and such estimates may require revision in future periods. The recorded amount is adjusted from time to time for specifically identified warranty and retrofit exposure. Actual warranty and retrofit expenses are charged against the Company's estimated warranty and retrofit liability when incurred. Factors that affect the Company's warranty and retrofit liability include the number of active installed units and historical and anticipated rates of warranty and retrofit claims and cost per claim.

Stock-Based Compensation

Stock-based compensation expense associated with stock options, restricted stock units ("RSUs"), performance restricted stock units ("PRSUs") and purchase rights under the Company's Amended and Restated Employee Stock Purchase Plan ("ESPP") and Nonqualified Employee Stock Purchase Plan ("Nonqualified ESPP") is measured at the grant date based on the fair value of the award, and is recognized, net of forfeitures, as expense over the remaining requisite service period (generally the vesting period) on a straight-line basis.

The fair value of stock option and employee stock purchase right under the ESPP is estimated at the grant date using the Black-Scholes option valuation model. The fair value of RSUs and employee stock purchase right under the Nonqualified ESPP is based on closing market price of the Company's common stock on the date of grant.

Stock-based compensation expense associated with PRSUs with graded vesting features and which contain both a performance and a service condition is measured based on the closing market price of the Company's common stock on the date of grant, and is recognized, net of forfeitures, as expense over the requisite service period using the graded vesting attribution method.

Stock-based compensation expense associated with performance-based stock options with graded vesting features and which contain both a performance and a service condition is measured based on fair value of stock options estimated at the grant date using the Black-Scholes option valuation model, and is recognized, net of forfeitures, as expense over the requisite service period using the graded vesting attribution method.

Compensation expense associated with PRSUs and performance-based stock option awards with graded vesting features and which contain both a performance and a service condition is only recognized if the Company has determined that it is probable that the performance condition will be met. The Company reassesses the probability of vesting at each reporting period and adjusts compensation expense based on its probability assessment.

Research and Development

Research and development costs include costs of developing new products and processes, as well as design and engineering costs. Such costs are charged to research and development expense as incurred.

Development costs related to software incorporated in the Company's products incurred subsequent to the establishment of technological feasibility are capitalized and amortized over the estimated useful lives of the related products. Technological feasibility is established upon completion of a working model.

Loss Contingencies

From time to time, the Company is involved in legal proceedings arising from the normal course of business activities. The Company evaluates the likelihood of an unfavorable outcome of legal proceedings to which it is a party and accrues a loss contingency when the loss is probable and reasonably estimable. Assessing legal contingencies involves significant judgment and estimates and the outcome of litigation is inherently uncertain and subject to numerous factors outside the Company's control. Significant judgment is required when the Company assesses the likelihood of any adverse judgments or outcomes, including the potential range of possible losses, and whether losses are probable and reasonably estimable.

Because of uncertainties related to these matters, the Company bases its estimates of whether a loss contingency is probable or reasonably possible, as well as the reasonable range of possible losses associated with each loss contingency, only on the information available at the time. As additional information becomes available, and at least quarterly, the Company reassesses the potential liability on each significant matter and may revise its estimates. These revisions could have a material impact on the Company's business, operating results or financial condition. The actual outcome of these legal proceedings may materially differ from the Company's estimates of potential liability, which could have a material adverse effect on the Company's business, operating results or financial condition.

Credit Risk and Inventory Supplier Concentrations

Financial instruments that potentially subject the Company to significant concentrations of credit risk consist primarily of cash and cash equivalents and accounts receivable. Cash equivalents consist of money market funds, which are invested through financial institutions in the United States. Deposits in these financial institutions may, at times, exceed federally insured limits. The Company has not experienced any losses in such accounts. The Company also has approximately $2.9 million of cash held by its foreign subsidiaries in Brazil, China and the United Kingdom. Management believes that the financial institutions that hold the Company’s cash and cash equivalents are financially sound and, accordingly, minimal credit risk exists with respect to these cash and cash equivalents.

Concentrations of credit risk in relation to customers with an accounts receivable balance of 10% or greater of total accounts receivable and customers with net revenue of 10% or greater of total revenue are presented below for the periods indicated.

| | Percentage of Accounts Receivable | | Percentage of Revenue | | |
|---|---|---|---|---|---|
| | December 31, | | Years Ended December 31, | | |
| | 2017 | 2016 | 2017 | 2016 | 2015 |
| CenturyLink | 42% | 28% | 31% | 21% | 22% |
| Windstream | * | 13% | * | 15% | * |

* Less than 10% of total accounts receivable or revenue.

The Company depends primarily on a small number of outside contract manufacturers for the bulk of its finished goods inventory. In particular, the Company relies on Flex for the manufacture of a large percentage of its products. The Company generally purchases its products through purchase orders with its suppliers or contract manufacturers. While the Company seeks to maintain a sufficient supply of its products, the Company’s business and results of operations could be adversely affected by a stoppage or delay in receiving such products, the receipt of defective parts, an increase in price of such products or the Company’s inability to obtain lower prices from its contract manufacturers and suppliers in response to competitive pressures.

Fair Value of Financial Instruments

The carrying amounts of cash and cash equivalents, marketable securities, trade receivables, accounts payable, line of credit and other accrued liabilities approximate their fair value due to their relatively short-term nature.

Cash, Cash Equivalents and Marketable Securities

The Company has invested its excess cash primarily in money market funds and highly liquid marketable securities such as corporate debt instruments, commercial paper and U.S. government agency securities. The Company considers all investments with maturities of three months or less when purchased to be cash equivalents. Marketable securities represent highly liquid corporate debt instruments, commercial paper and U.S. government agency securities with maturities greater than 90 days at date of purchase. Marketable securities with maturities greater than one year are classified as current because management considers all marketable securities to be available for current operations.

Cash equivalents and marketable securities are stated at amounts that approximate fair value based on quoted market prices.

The Company’s investments have been classified and accounted for as available-for-sale. Such investments are recorded at fair value and unrealized holding gains and losses are reported as a separate component of comprehensive loss in the stockholders’ equity until realized. Realized gains and losses on sales of marketable securities, if any, are determined on the specific identification method and are reclassified from accumulated other comprehensive income to results of operations as other income (expense).

The Company, to date, has not determined that any of the unrealized losses on its investments are considered to be other-than-temporary. The Company reviews its investment portfolio to determine if any security is other-than-temporarily impaired, which would require the Company to record an impairment charge in the period any such determination is made. In making this judgment, the Company evaluates, among other things: the duration and extent to which the fair value of a security is less than its cost; the financial condition of the issuer and any changes thereto; and the Company’s intent and ability to hold its investment for a period of time sufficient to allow for any anticipated recovery in market value, or whether the Company will more likely than not be required to sell the security before recovery of its amortized cost basis. The Company had no investments as of December 31, 2017.

Allowance for Doubtful Accounts

The Company maintains an allowance for doubtful accounts for estimated losses resulting from the inability of its customers to make required payments. The Company records a specific allowance based on an analysis of individual past-due balances. Additionally, based on historical write-offs and the Company’s collection experience, the Company records an additional allowance based on a percentage of outstanding receivables. The Company performs credit evaluations of its customers’ financial condition. These evaluations require significant judgment and are based on a variety of factors including, but not limited to, current economic trends, payment history and a financial review of the customer. Actual collection losses may differ from management’s estimates, and such differences could be material to our financial position and results of operations.

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Inventory Valuation

Inventory, which primarily consists of finished goods purchased from contract manufacturers, is stated at the lower of cost, determined by the first-in, first-out method, or market value. Inbound shipping costs are included in cost of inventory. In addition, the Company, from time to time, procures component inventory primarily as a result of manufacturing discontinuation of critical components by suppliers. The Company regularly monitors inventory quantities on hand and records write-downs for excess and obsolete inventories based on the Company's estimate of demand for its products, potential obsolescence of technology, product life cycles and whether pricing trends or forecasts indicate that the carrying value of inventory exceeds its estimated selling price. These factors are impacted by market and economic conditions, technology changes and new product introductions and require estimates that may include elements that are uncertain. Actual demand may differ from forecasted demand and may have a material effect on gross profit. If inventory is written down, a new cost basis is established that cannot be increased in future periods. Shipments from suppliers or contract manufacturers before the Company receives them are recorded as in-transit inventory when title and the significant risks and rewards of ownership have passed to the Company.

Deferred Revenue and Deferred Cost of Revenue

Deferred revenue results from transactions where the Company billed the customer for product shipped or services performed but not all revenue recognition criteria have been met. When the Company's products have been shipped, but the product revenue associated with the arrangement has been deferred as a result of not meeting the criteria for immediate revenue recognition, the Company also defers the related inventory costs for the delivered items until all criteria are met for revenue recognition. The Company defers tangible direct costs associated with hardware products delivered based on the inventory cost at the time of shipment.

Certain costs directly related to the delivery of professional services that cannot be accounted for separately from the undelivered items included in a multiple element arrangement or have not been earned yet are also capitalized and deferred, if deemed recoverable, until all revenue recognition criteria are met. Accordingly, all cost of services incurred directly related to the delivery of a professional service item in which revenue has not yet been recognized are deferred and recorded within "Deferred cost of revenue" in the Company's Consolidated Balance Sheets.

As of December 31, 2017 and 2016, deferred cost of revenue was $2.4 million and $34.8 million, respectively.

The Company evaluates deferred cost of revenue for recoverability based on multiple factors, including whether net revenue will exceed the amount of deferred cost of revenue applicable to each deliverable specified in the arrangement. To the extent that deferred cost of revenue is determined to be unrecoverable, the Company adjusts deferred cost of revenue with a charge to cost of revenue in the current period. In connection with its recoverability assessments as of year end, the Company did not write down any deferred costs at December 31, 2017 and wrote down deferred costs by $2.2 million at December 31, 2016.

The Company recognizes deferred revenue and associated deferred cost of revenue, as revenue and cost of revenue respectively, in the Consolidated Statements of Comprehensive Loss once all revenue recognition criteria have been met.

Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation, and are depreciated using the straight-line method over the estimated useful life of each asset. Computer equipment is depreciated over two years; purchased software is depreciated over three years; test equipment is depreciated over three years; furniture and fixtures are depreciated over seven years; and leasehold improvements are depreciated over the shorter of the respective lease term or the estimated useful life of the asset. Maintenance and repairs are charged to expense as incurred.

Software Development Costs

Software development costs are capitalized beginning when a product's technological feasibility has been established by completion of a working model of the product and amortization begins when a product is available for general release to customers. The period between the achievement of technological feasibility and the general release of the Company's products has typically been of a short duration. Costs incurred for the years ended 2017, 2016 and 2015 were not material.

Goodwill

Goodwill was recorded as a result of the Company's acquisitions of Occam Networks, Inc. ("Occam") in February 2011 and Optical Solutions, Inc. in February 2006. The Company records goodwill when consideration paid in a business acquisition exceeds the fair value of the net tangible assets and the identified intangible assets acquired. Goodwill is not amortized but instead is subject to an annual impairment test or more frequently if events or changes in circumstances indicate that it may be impaired. The Company evaluates goodwill on an annual basis as of the end of the second quarter of each fiscal year. Management has determined that it operates as a single reporting unit and, therefore, evaluates goodwill impairment at the enterprise level.

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In an annual impairment test, the Company first assesses qualitative factors to determine whether it is necessary to perform the two-step quantitative goodwill impairment test. In assessing the qualitative factors, management considers the impact of these key factors: macro-economic conditions, industry and market environment, overall financial performance of the Company, cash flow from operating activities, market capitalization and stock price. If the Company determines as a result of the qualitative assessment that it is more likely than not (that is, a likelihood of more than 50 percent) that the fair value of a reporting unit is less than its carrying amount, then the quantitative test is required. Otherwise, no further testing is required.

In a quantitative test, the Company compares its fair value to its carrying value including goodwill. The Company determines its fair value using both an income approach and a market approach. Under the income approach, the Company determines fair value based on estimated future cash flows, discounted by an estimated weighted-average cost of capital, which reflects the overall level of inherent risk of the Company and the rate of return an outside investor would expect to earn. Under the market-based approach, the Company utilizes information regarding the Company as well as publicly available industry information to determine earnings multiples that are used to value the Company. If the carrying value of the Company exceeds its fair value, the Company will determine the amount of impairment loss by comparing the implied fair value of goodwill with the carrying value of goodwill. An impairment charge is recognized for the excess of the carrying value of goodwill over its implied fair value.

At the end of the second quarter of 2017, the Company completed its annual goodwill impairment test. Based on its assessment of the above qualitative factors, management concluded that the fair value of the Company was more likely than not greater than its carrying amount as of July 1, 2017. As such, it was not necessary to perform the two-step quantitative goodwill impairment test at the time.

There have been no significant events or changes in circumstances subsequent to the 2017 annual impairment test that would more likely than not indicate that the carrying value of goodwill may have been impaired as of December 31, 2017. Therefore, there was no impairment to the carrying value of the Company’s goodwill as of December 31, 2017. There were no impairment losses for goodwill in the years ended December 31, 2016 or 2015.

Income Taxes

The Company evaluates its tax positions and estimates its current tax exposure along with assessing temporary differences that result from different book to tax treatment of items not currently deductible for tax purposes. These differences result in deferred tax assets and liabilities on the Company’s balance sheets, which are estimated based upon the difference between the financial statement and tax bases of assets and liabilities using the enacted tax rates that will be in effect when these differences reverse. In general, deferred tax assets represent future tax benefits to be received when certain expenses previously recognized in the Company’s statements of operations become deductible expenses under applicable income tax laws or loss or credit carryforwards are utilized. Accordingly, realization of the Company’s deferred tax assets is dependent on future taxable income against which these deductions, losses and credits can be utilized.

The Company must assess the likelihood that the Company’s deferred tax assets will be recovered from future taxable income, and to the extent the Company believes that recovery is not more likely than not, the Company must establish a valuation allowance. Management judgment is required in determining the Company’s provision for income taxes, the Company’s deferred tax assets and liabilities and any valuation allowance recorded against the Company’s net deferred tax assets. Excluding foreign operations, the Company recorded a full valuation allowance at each balance sheet date presented because, based on the available evidence, the Company believes it is more likely than not that it will not be able to utilize all of its deferred tax assets in the future. The Company intends to maintain the full valuation allowance until sufficient evidence exists to support the reversal of the valuation allowance.

Foreign Currency Translation

Assets and liabilities of the Company’s wholly owned foreign subsidiaries are translated from their respective functional currencies at exchange rates in effect at the balance sheet date, and revenue and expenses are translated at the monthly average exchanges rates. Translation adjustments are reflected as a separate component of stockholders’ equity. Realized foreign currency transaction gains and losses were not significant during the years ended December 31, 2017, 2016 and 2015.

Newly Adopted Accounting Standards

Stock-Based Compensation

In March 2016, the FASB issued Accounting Standards Update No. 2016-09, Compensation – Stock Compensation (Topic 718): Improvements to Employee Share – Based Payment Accounting ("ASU 2016-09"), which simplifies several aspects of the accounting for employee share-based payment transactions for both public and nonpublic entities, including the accounting for income taxes, forfeitures and statutory tax withholding requirements, as well as classification in the statement of cash flows. The Company adopted ASU 2016-09 in the first quarter of 2017 and had the following impact:

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a. Accounting for Income Taxes – The primary impact of the adoption was the recognition of excess tax benefits and tax deficiencies through the statement of operations when the awards vest or are settled rather than through paid-in capital. The new guidance eliminates the requirement to delay the recognition of excess tax benefits until it reduces current taxes payable and requires the recognition of excess tax benefits and tax deficiencies in the period they arise. The Company adopted this guidance on a modified retrospective basis beginning on January 1, 2017, and the adoption had a cumulative-effect adjustment to the beginning balance of deferred tax asset and was fully offset by the corresponding valuation allowance as of January 1, 2017. The adoption had no cumulative-effect adjustment on January 1, 2017 accumulated deficit as the Company's net operating loss carryforwards are offset by a full valuation allowance.
b. Classification of Excess Tax Benefits on the Statement of Cash Flows – ASU 2016-09 requires all tax-related cash flows resulting from share-based payments to be reported as operating activities on the statement of cash flows, a change from the previous requirement to present windfall tax benefits as an inflow from financing activities and an outflow from operating activities. The Company adopted this guidance prospectively beginning on January 1, 2017. The adoption of ASU 2016-09 as it relates to this matter had no impact to the Company's consolidated financial statements.
c. Forfeitures – The Company has historically recognized stock-based compensation expense net of estimated forfeitures on all unvested awards and elected to continuously do so with the adoption of this new guidance. Hence, the adoption of ASU 2016-09 as it relates to this matter had no impact to the Company's consolidated financial statements.
d. Minimum Statutory Tax Withholding Requirements – ASU 2016-09 allows companies to withhold an amount up to the employee's maximum individual tax rate in the relevant jurisdiction without resulting in liability classification of the award. The Company adopted this guidance using a modified retrospective approach. The adoption had no impact on the January 1, 2017 accumulated deficit as the Company had no outstanding liability awards that would otherwise qualify for equity classification under this new guidance.
e. Classification of Employee Taxes Paid on the Statement of Cash Flows When an Employer Withholds Shares for Tax-Withholding Purposes – ASU 2016-09 clarifies that all cash payments made to taxing authorities on the employees' behalf for withheld shares should be presented as financing activities on the statement of cash flows. The Company has historically presented the taxes paid related to net share settlement of equity awards as a financing activity on the statements of cash flows. Hence, the adoption of ASU 2016-09 as it relates to this matter had no impact to the Company's consolidated financial statements.

Inventory

In July 2015, the FASB issued Accounting Standards Update No. 2015-11, Inventory (Topic 330): Simplifying the Measurement of Inventory ("ASU 2015-11"), which requires measurement of inventory at lower of cost and net realizable value, versus lower of cost or market. Net realizable value is the estimated selling price in the ordinary course of business, less reasonably predictable costs of completion, disposal and transportation. The Company adopted ASU 2015-11 prospectively beginning on January 1, 2017. The adoption of this standard had no material impact on the Company's consolidated financial statements.

Recent Accounting Pronouncements Not Yet Adopted

Leases

In February 2016, the FASB issued Accounting Standards Update No. 2016-02, Leases (Topic 842) ("ASU 2016-02"), which requires recognition of an asset and liability for lease arrangements longer than twelve months. ASU 2016-02 will be effective for the Company beginning in the first quarter of 2019. Early application is permitted, and it is required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. The Company is not planning to early adopt, and accordingly, it will adopt the new standard effective January 1, 2019. The Company intends to elect the available practical expedients on adoption. The Company is currently assessing the potential impact of adopting this new guidance on its consolidated financial statements. The Company expects its assets and liabilities to increase as the new standard requires recognition of right-of-use assets and lease liabilities for operating leases, but does not expect any material impact on its income (loss) from operations or net income (loss) as a result of the adoption of this standard.

Revenue from Contracts with Customers

In May 2014, the FASB issued Accounting Standards Update No. 2014-09, Revenue from Contracts with Customers (Topic 606) (“ASU 2014-09”), which provides guidance for revenue recognition. ASU 2014-09 supersedes the revenue recognition requirements in Topic 605, Revenue Recognition, and most industry-specific guidance. Additionally, it supersedes some cost

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guidance included in Subtopic 605-35, Revenue Recognition – Construction-Type and Production-Type Contracts, and creates new Subtopic 340-40, Other Assets and Deferred Costs – Contracts with Customers. The standard's core principle is that a company will recognize revenue when it transfers promised goods or services to customers in an amount that reflects the consideration to which the company expects to be entitled in exchange for those goods or services. In doing so, companies will need to use more judgment and make more estimates than under the previous guidance. These may include identifying performance obligations in the contract, estimating the amount of variable consideration to include in the transaction price and allocating the transaction price to each separate performance obligation. On August 12, 2015, the FASB issued Accounting Standards Update No. 2015-14, Revenue from Contracts with Customers (Topic 606), Deferral of the Effective Date ("ASU 2015-14") to defer the effective date of ASU 2014-09 by one year. ASU 2015-14 permits early adoption of the new revenue standard, but not before its original effective date. In April 2016, the FASB issued Accounting Standards Update No. 2016-10, Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing ("ASU 2016-10"), which further clarifies guidance related to identifying performance obligations and licensing implementation guidance contained in ASU 2014-09. In May 2016, the FASB issued Accounting Standards Update No. 2016-12, Revenue from Contracts with Customers (Topic 606): Narrow-Scope Improvements and Practical Expedients, ASU 2016-12, which addresses narrow-scope improvements to the guidance on collectability, non-cash consideration, and completed contracts at transition and provides a practical expedient for contract modifications at transition and an accounting policy election related to the presentation of sales taxes and other similar taxes collected from customers.

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 Company adopted the new standard effective January 1, 2018 using the modified retrospective transition method applied to those contracts which are not completed as of that date, which will result in a cumulative catch up adjustment to decrease the Company's accumulated deficit as of January 1, 2018, by approximately $1 million and will require additional disclosures, including disclosures comparing results under the new standard to current GAAP during 2018. The Company is still assessing the final impact of adoption on one minor revenue stream, but expect the impact to be immaterial.

A description of the impact of the new standard on the Company's business is as follows:

- For stand-alone purchase orders, while the allocation of revenue to deliverables between products and services may change due to new methodologies under the standard, the Company expects that the impact of this adjustment will not be significant.
- For products sold with the Company's turnkey network improvement projects, the recognition of revenue under current GAAP was often delayed until project completion as a result of the Company not meeting certain recognition criteria. Under the new standard, revenue from these arrangements may be accelerated as revenue on products may be recognized upon delivery and services may be recognized over time as the services are performed. As there were minimal open projects under turnkey arrangements as of December 31, 2017, the impact of this change on the Company's accumulated deficit is not expected to be significant although it could have a material impact on the timing of revenue recognition in the future.
- Revenue from the Company's Cloud product offerings is not expected to be impacted by the adoption of the new standard.
- Under current GAAP, revenue from software licenses is recognized ratably over the term of the related post-contract support ("PCS") as the Company did not have VSOE for PCS for the licenses sold to date. Under the new standard, revenue allocated to the licenses is expected to be recognized upon delivery while the revenue allocated to PCS is expected to be recognized ratably. The impact of this change was not material to the Company's accumulated deficit upon adoption as the Company only began selling software licenses in 2017.

In connection with the adoption of the new revenue standard effective January 1, 2018, the Company also adopted ASC 340-40, Other Assets and Deferred Costs – Contracts with Customers, with respect to capitalization and amortization of incremental costs of obtaining a contract. As a result, the Company will capitalize additional costs of obtaining a contract, including sales commissions, as the guidance requires the capitalization of all incremental costs incurred to obtain a contract with a customer that it would not have incurred if the contract had not been obtained, provided it expects to recover the costs. The Company has determined that sales commissions as a result of obtaining extended warranty customer contracts are recoverable, and as a result, the Company will defer $0.8 million of related sales commissions, which will result in a cumulative catch up adjustment to decrease the Company's accumulated deficit as of January 1, 2018, and amortize them over the period that the related revenue is recognized. The adoption of this standard is not expected to have a material impact to the Company's consolidated financial statements.

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2. Prior Period Recast

The Company's revenue from services for the year ended December 31, 2017 represents more than 10% of total revenue; hence, the services revenue and the associated cost of revenue are presented separately in the accompanying Consolidated Statements of Comprehensive Loss. Services include professional services, customer support, software maintenance, extended warranty subscriptions, training and managed services. Accordingly, revenue and cost of revenue for the years ended December 31, 2016 and 2015 are recast solely to conform with the current year presentation. The recast does not affect total revenue, total cost of revenue, gross profit, operating expenses or net loss.

3. Cash, Cash Equivalents and Marketable Securities

Cash, cash equivalents and marketable securities consisted of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Cash and cash equivalents: | | |
| Cash | $35,999 | $34,340 |
| Money market funds | 3,776 | 15,020 |
| Commercial paper | — | 999 |
| Total cash and cash equivalents | 39,775 | 50,359 |
| Marketable securities: | | |
| Corporate debt securities | — | 17,272 |
| Commercial paper | — | 6,275 |
| U.S. government agency securities | — | 4,201 |
| Total marketable securities | — | 27,748 |
| Total cash, cash equivalents and marketable securities | $39,775 | $78,107 |

The carrying amounts of the Company's money market funds approximate their fair values due to their nature, duration and short maturities.

As of December 31, 2016, the amortized cost and fair value of marketable securities were as follows (in thousands):

| | Amortized Cost | Gross Unrealized Gains | Gross Unrealized Losses | Fair Value |
|---|---|---|---|---|
| Corporate debt securities | $ 17,279 | $ 1 | $ (8 ) | $17,272 |
| Commercial paper | 6,275 | — | — | 6,275 |
| U.S. government agency securities | 4,200 | 1 | — | 4,201 |
| Total marketable securities | $ 27,754 | $ 2 | $ (8 ) | $27,748 |

As of December 31, 2016, there were no marketable securities classified and accounted for as available-for-sale securities that had been in a continuous unrealized loss position in excess of twelve months.

4. Fair Value Measurements

The Company measures its cash equivalents and marketable securities at fair value on a recurring basis. Fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability. The Company utilizes the following three-tier value hierarchy which prioritizes the inputs used in measuring fair value:

Level 1 – Observable inputs that reflect quoted prices (unadjusted) for identical assets or liabilities in active markets.

Level 2 – Observable inputs other than quoted prices included in Level 1 for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-driven valuations in which all significant inputs and significant value drivers are observable in active markets.

Level 3 – Unobservable inputs to the valuation derived from fair valuation techniques in which one or more significant inputs or significant value drivers are unobservable. The fair value hierarchy also requires the Company

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to maximize the use of observable inputs, when available, and to minimize the use of unobservable inputs when determining inputs and determining fair value.

The following table sets forth the Company's financial assets measured at fair value as of December 31, 2017 and 2016, based on the three-tier fair value hierarchy (in thousands):

| As of December 31, 2017 | Level 1 | Level 2 | Total |
|---|---|---|---|
| Money market funds | $3,776 | $ — | $3,776 |
| Commercial paper | — | — | — |
| U.S. government agency securities | — | — | — |
| Total | $3,776 | $ — | $3,776 |

| As of December 31, 2016 | Level 1 | Level 2 | Total |
|---|---|---|---|
| Money market funds | $15,020 | $— | $15,020 |
| Corporate debt securities | — | 17,272 | 17,272 |
| Commercial paper | — | 7,274 | 7,274 |
| U.S. government agency securities | — | 4,201 | 4,201 |
| Total | $15,020 | $28,747 | $43,767 |

The fair values of money market funds classified as Level 1 were derived from quoted market prices as active markets for these instruments exist. The fair values of corporate debt securities, commercial paper and U.S. government agency securities classified as Level 2 were derived from quoted market prices for similar instruments indexed to prevailing market yield rates. The Company has no level 3 financial assets. The Company did not have any transfers between Level 1 and Level 2 of the fair value hierarchy during the twelve months ended December 31, 2017 and 2016.

5. Balance Sheet Details

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

| | December 31, 2017 | 2016 |
|---|---|---|
| Accounts receivable | $81,793 | $52,792 |
| Allowance for doubtful accounts | (579) | (518) |
| Product return reserve | (822) | (938) |
| | $80,392 | $51,336 |

The table below summarizes the changes in allowance for doubtful accounts and product return reserve for the periods indicated (in thousands):

| | Balance at Beginning of Year | Additions Charged to Costs or Expenses or Revenue | Deductions and Write Offs | Balance at End of Year |
|---|---|---|---|---|
| Year Ended December 31, 2017 | | | | |
| Allowance for doubtful accounts | $ 518 | $ 103 | $ (42) | $ 579 |
| Product return reserve | 938 | 3,682 | (3,798) | 822 |
| Year Ended December 31, 2016 | | | | |
| Allowance for doubtful accounts | $ 501 | $ 232 | $ (215) | $ 518 |
| Product return reserve | 663 | 3,679 | (3,404) | 938 |
| Year Ended December 31, 2015 | | | | |
| Allowance for doubtful accounts | $ 241 | $ 405 | $ (145) | $ 501 |

| | | | | |
|---|---|---|---|---|
| Product return reserve | 508 | 4,224 | (4,069) | 663 |

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Inventory consisted of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Raw materials | $1,211 | $1,827 |
| Finished goods | 30,318 | 42,718 |
| | $31,529 | $44,545 |

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

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Test equipment | $39,952 | $43,580 |
| Computer equipment and purchased software | 32,175 | 30,306 |
| Furniture and fixtures | 2,714 | 2,831 |
| Leasehold improvements | 6,029 | 6,898 |
| | 80,870 | 83,615 |
| Accumulated depreciation and amortization | (65,189 ) | (65,631 ) |
| | $15,681 | $17,984 |

Depreciation and amortization expense was $10.2 million, $8.3 million and $10.3 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Accrued liabilities consisted of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Accrued compensation and related benefits | $15,563 | $19,541 |
| Accrued professional and consulting fees | 9,604 | 8,205 |
| Accrued warranty and retrofit | 8,708 | 12,214 |
| Accrued excess and obsolete inventory at contract manufacturers | 2,430 | 1,327 |
| Accrued non-income related taxes | 1,778 | 699 |
| Accrued restructuring charges | 1,417 | — |
| Accrued business events | 1,272 | — |
| Advance customer payments | 1,050 | 20,726 |
| Accrued insurance | 827 | 804 |
| Accrued freight | 593 | 1,198 |
| Accrued customer rebates | 382 | 1,931 |
| Accrued other | 5,655 | 3,070 |
| | $49,279 | $69,715 |

Accrued Warranty and Retrofit

The Company provides a standard warranty for its hardware products. Hardware generally has a one-, three-, or five-year standard warranty from the date of shipment. Under certain circumstances, the Company also provides fixes on specifically identified performance failures for products that are outside of the standard warranty period and recognizes estimated costs related to retrofit activities upon identification of such product failures. The Company accrues for potential warranty and retrofit claims based on the Company’s historical product failure rates and historical costs incurred in correcting product failures along with other relevant information related to any specifically identified product failures. The Company’s warranty and retrofit accruals are based on estimates of losses that are probable based on information available. The adequacy of the accrual is reviewed on a periodic basis and adjusted, if necessary, based on additional information as it becomes available. Changes in the Company’s accrued warranty and retrofit liability were as follows (in thousands):

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| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Balance at beginning of period | $12,214 | $9,564 | $9,553 |
| Provision for warranty and retrofit charged to cost of revenue | 8,720 | 9,898 | 4,661 |
| Utilization of reserve | (12,226 ) | (6,816 ) | (4,115 ) |
| Adjustments to pre-existing reserve | — | (432 ) | (535 ) |
| Balance at end of period | $8,708 | $12,214 | $9,564 |

Advance customer payments as of December 31, 2017 and 2016 primarily included $0.9 million and $20.3 million, respectively, which the Company received as payments in advance of completion of final customer acceptance of the products and services provided in connection with turnkey network improvement projects for a customer.

Deferred revenue consisted of the following (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Current: | | |
| Product and services | $9,125 | $24,472 |
| Extended warranty | 3,951 | 3,382 |
| | 13,076 | 27,854 |
| Non-current: | | |
| Product and services | 18 | 22 |
| Extended warranty | 20,627 | 20,215 |
| | 20,645 | 20,237 |
| | $33,721 | $48,091 |

6. Credit Facility

On August 7, 2017, the Company entered into a loan and security agreement (the “Loan Agreement”) with Silicon Valley Bank (“SVB”). In connection with the entry into the Loan Agreement, the Company contemporaneously terminated its credit agreement previously entered into with Bank of America, N.A. on July 29, 2013 (as amended on December 23, 2015, the “Credit Agreement”). The Credit Agreement provided for a revolving facility in the aggregate principal amount of up to $50.0 million, with any borrowings limited to a maximum consolidated leverage ratio of consolidated funded indebtedness to consolidated EBITDA (as defined in the Credit Agreement).

The Loan Agreement provides for a senior secured revolving credit facility with SVB, pursuant to which SVB agreed to make revolving advances available to the Company in a principal amount of up to $30.0 million based on a customary accounts receivable borrowing base, subject to certain exceptions for accounts originating outside the United States and certain specific accounts, which could reduce the amount available to the Company under the credit facility. The credit facility includes a $10.0 million sublimit for the issuance of letters of credit. The letters of credit issued under the Loan Agreement will reduce, on a dollar-for-dollar basis, the amount available under the credit facility. The credit facility matures, and all outstanding amounts become due and payable, on August 7, 2019. Subject to certain exceptions, the Company will also be required to pay to SVB a fee of $0.3 million if it terminates the credit facility prior to August 7, 2018. The credit facility is secured by substantially all of the Company’s assets, including the Company’s intellectual property. Loans under the credit facility will bear interest through maturity at a variable annual rate based upon an annual rate of either a prime rate or a LIBOR rate, plus an applicable margin between 0.50% to 1.50% for prime rate advances and between 2.00% and 3.00% for LIBOR advances based on the Company’s maintenance of an applicable liquidity ratio. Depending on applicable liquidity ratio, the Company may be required to apply cash collections on its accounts receivable against any outstanding balance. The Company may thereafter borrow funds again subject to the availability under the line of credit.

The credit facility includes affirmative and negative covenants applicable to the Company and its subsidiaries. Furthermore, the Loan Agreement requires the Company to maintain a liquidity ratio at minimum levels set forth in more detail in the Loan Agreement. The credit facility also includes events of default, the occurrence and continuation of which would provide SVB with the right to demand immediate repayment of any principal and unpaid interest under the credit facility, and to exercise remedies against the Company and the collateral securing the loans under the credit facility. For the month ended November 30, 2017, the Company was not able to maintain the minimum Adjusted Quick Ratio (as defined in the Loan Agreement) at the level required in the Loan Agreement, which constituted an event of default. Although SVB waived this event of default effective as of November 30, 2017 and, therefore, this default did not change the Company’s ability to borrow under the Loan Agreement, the Company was required to amend certain covenants under the Loan Agreement. In February 2018, the Company entered into an amendment to the Loan Agreement that, among other things, amended certain affirmative financial covenants,

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including reductions to the required minimum level of the Adjusted Quick Ratio (as defined in the Loan Agreement) and the inclusion of an additional financial covenant related to the maintenance of Adjusted EBITDA (as defined in the Loan Agreement). As of December 31, 2017, the Company was in compliance with these requirements.

As of December 31, 2017, the Company had borrowings outstanding of $30.0 million, representing the full amount available under the line of credit.

7. Commitments and Contingencies

Lease Commitments

The Company leases office space under non-cancelable operating leases. Certain of the Company's operating leases contain renewal options and rent acceleration clauses. Future minimum payments under the non-cancelable operating leases consisted of the following as of December 31, 2017 (in thousands):

| Year Ending December 31, | Minimum Future Lease Payments |
|---|---|
| 2018 | $ 2,805 |
| 2019 | 1,094 |
| 2020 | 751 |
| 2021 | 287 |
| 2022 | 19 |
| Total | $ 4,956 |

The Company leases its primary office space in Petaluma, California under a lease agreement ("Petaluma Lease") that, as amended, expires February 2019. In January 2013, the Company entered into an amendment to its Petaluma Lease ("Amendment") to extend the lease term to February 2019. In connection with the Petaluma Lease and the Amendment, the Company received lease incentives of $1.2 million and $0.4 million, respectively, which can be used for leasehold improvements or be applied as credits to rent payments. The Company capitalized the full amount of the lease incentives upon inception of the respective agreement and these incentives are being amortized to reduce rent expense over the extended lease term. As of December 31, 2017, the total unamortized lease incentive is not significant. Payments under the Company's operating leases that escalate over the term of the lease are recognized as rent expense on a straight-line basis.

The above table also includes future minimum lease payments primarily for our facilities in Minneapolis, Minnesota; Nanjing, China; Richardson, Texas; and San Jose and Santa Barbara, California, which expire at various dates through 2022.

For the years ended December 31, 2017, 2016 and 2015, total rent expense of the Company was $3.7 million, $3.7 million and $3.5 million, respectively.

Purchase Commitments

The Company's primary contract manufacturers place orders for component inventory in advance based upon the Company's build forecasts in order to reduce manufacturing lead times and ensure adequate component supply. The components are used by the contract manufacturers to build the products included in the build forecasts. The Company generally does not take ownership of the components held by contract manufacturers. The Company places purchase orders with its contract manufacturers in order to fulfill its monthly finished product inventory requirements. The Company incurs a liability when the contract manufacturer has converted the component inventory to a finished product and takes ownership of the inventory when transferred to the designated shipping warehouse. In the event of termination of services with a contract manufacturer, the Company may be required to purchase the remaining components inventory held by the contract manufacturer as well as any outstanding orders pursuant to the contractual provisions with such contract manufacturer. As of December 31, 2017, the Company had approximately $60.5 million of outstanding purchase commitments for inventories to be delivered by its suppliers, including contract manufacturers, within one year.

The Company has from time to time, and subject to certain conditions, reimbursed its primary contract manufacturer for component inventory purchases when this inventory has been rendered excess or obsolete, for example due to manufacturing and engineering change orders resulting from design changes, manufacturing discontinuation of parts by its suppliers, or in cases where inventory levels greatly exceed projected demand. The estimated excess and obsolete inventory liabilities related to such manufacturing and engineering change orders and other factors, which are included in accrued liabilities in the accompanying balance sheets, were $2.4 million and $1.3 million as of December 31, 2017 and 2016, respectively. The Company records the related charges in cost of product revenue in its Consolidated Statements of Comprehensive Loss.

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Contingencies

The Company evaluates the circumstances regarding outstanding and potential litigation and other contingencies on a quarterly basis to determine whether there is at least a reasonable possibility that a loss exists requiring accrual or disclosure, and if so, whether an estimate of the possible loss or range of loss can be made. When a loss is probable and reasonably estimable, the Company accrues for such amount based on its estimate of the probable loss considering information available at that time. When a loss is reasonably possible, the Company discloses the estimated possible loss or range of loss in excess of amounts accrued if material. Except as otherwise disclosed below, the Company does not believe that there was a reasonable possibility that a material loss may have been incurred during the period presented with respect to the matters disclosed.

Litigation

From time to time, the Company is involved in various legal proceedings arising from the normal course of business activities.

Steinhardt v. Howard-Anderson, et al.

As previously disclosed, in connection with the Company's 2011 merger transaction with Occam Networks, Inc. (“Occam”) a complaint was filed in 2010 by stockholders of Occam in the Delaware Court of Chancery styled as Steinhardt v. Howard-Anderson, et al. (Case No. 5878-VCL). The complaint, as initially amended, sought injunctive relief rescinding the merger transaction and an award of damages in an unspecified amount, as well as plaintiffs' costs, attorneys' fees and other relief, and also alleged that Occam (which has since merged into Calix), each Occam director and the Occam CFO breached their fiduciary duties by failing to attempt to obtain the best purchase price for Occam and failing to disclose certain allegedly material facts about the merger transaction in the preliminary proxy statement and prospectus included in the Registration Statement on Form S-4 for the transaction. In April 2016, the parties entered into a memorandum of understanding of a settlement in principle (“Settlement”) to resolve all of the claims pending before the Delaware Court of Chancery and related claims for a total settlement consideration of $35.0 million. In September 2016, the court issued its Order and Final Judgment, terminating the case before the Delaware Court of Chancery. Under the Settlement terms, Calix did not pay for any portion of the settlement consideration. Under the terms of the Settlement (and separate from the settlement consideration), the Company received a cash payment of $4.5 million in partial recovery of its out-of-pocket expenses incurred in the litigation in November 2016. Accordingly, the Company recognized $4.5 million as “Litigation settlement gain” in the year ended December 31, 2016, presented as a reduction to operating expenses in the accompanying Consolidated Statements of Comprehensive Loss. The Company recorded litigation defense costs and expenses in excess of its insurance coverage of $6.4 million and $3.7 million for the years ended December 31, 2016 and 2015, respectively, as operating expenses in the accompanying Consolidated Statements of Comprehensive Loss. The Company also did not previously accrue any estimated loss in connection with this action and, as a result of the Settlement, did not recognize any loss related to this action.

The Company is not currently a party to any legal proceedings that, if determined adversely to the Company, in management’s opinion, are currently expected to individually or in the aggregate have a material adverse effect on the Company’s business, operating results or financial condition taken as a whole.

Indemnifications

The Company from time to time enters into contracts that require it to indemnify various parties against claims from third parties. These contracts primarily relate to (i) certain real estate leases, under which the Company may be required to indemnify property owners for environmental and other liabilities, and other claims arising from the Company’s use of the applicable premises, (ii) agreements with the Company’s officers, directors and certain employees, under which the Company may be required to indemnify such persons for liabilities arising out of their relationship with the Company, (iii) contracts under which the Company may be required to indemnify customers against third-party claims that a Company product infringes a patent, copyright or other intellectual property right and (iv) agreements under which the Company may be required to indemnify the counterparty for certain claims that may be brought against them arising from the Company’s acts or omissions with respect to the transactions contemplated by such agreements.

Because any potential obligation associated with these types of contractual provisions are not quantified or stated, the overall maximum amount of the obligation cannot be reasonably estimated. Historically, the Company has not been required to make payments under these obligations, and no liabilities have been recorded for these obligations in the accompanying Consolidated Balance Sheets.

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8. Stockholders' Equity
Preferred Stock
The Board of Directors has the authority, without action by stockholders with the exception of stockholders who hold board positions, to designate and issue up to 5.0 million shares of preferred stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences, sinking fund terms and the number of shares constituting any series or the designation of such series, any or all of which may be greater than the rights of common stock. The issuance of the Company's preferred stock could adversely affect the voting power of holders of common stock and the likelihood that such holders will receive dividend payments and payments upon liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deferring or preventing a change in control of the Company or other corporate action. Subsequent to the Company's initial public offering and the conversion of all preferred stock outstanding at that date, the Board of Directors has not designated any rights, preference or powers of any preferred stock and no shares of preferred stock have been issued.
Common Stock
Holders of the Company's common stock are entitled to receive dividends, if any, as may be declared from time to time by the Board of Directors out of legally available funds. No dividends have been declared or paid as of December 31, 2017. In the event of the Company's liquidation, dissolution or winding up, holders of the Company's common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of the Company's debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then outstanding shares of preferred stock.
Equity Incentive Plans
As of December 31, 2017, the Company maintained two equity incentive plans, the 2002 Stock Plan ("2002 Plan") and the 2010 Equity Incentive Award Plan ("2010 Plan"). These plans were approved by the Company's stockholders at the time of adoption. Under the 2002 Plan, the Company granted stock options at a price not less than 100% of the fair market value of the common stock on the date of grant. The majority of the stock options granted under the 2002 Plan vested over 4 years and expire in 10 years.
The 2010 Plan allows the Company to grant stock options, restricted stock awards ("RSAs"), RSUs, PRSUs, stock appreciation rights, dividend equivalents, deferred stock and stock payments to employees, directors and consultants of the Company. A total of 4.7 million shares of common stock were initially reserved for future issuance under the 2010 Plan, which became effective upon the completion of the Company's initial public offering of common stock. In addition, on the first day of each year beginning in 2011 and ending in 2020, the 2010 Plan provides for an annual automatic increase to the shares reserved for issuance equal to the lesser of: i) 2% of the outstanding shares at the end of the previous year or ii) 666,666 shares. No more than 17.2 million shares of Common Stock may be issued upon the exercise of Incentive Stock Options. Pursuant to the automatic annual increase, a total of 4.7 million additional shares had been reserved as of December 31, 2017 under the 2010 Plan since 2011.
Upon the effectiveness of the 2010 Plan, equity awards were granted only under the 2010 Plan and shares of common stock previously reserved for issuance under the prior plan became available for issuance under the 2010 Plan. To date, awards granted under the 2010 Plan consist of stock options, RSAs, RSUs and PRSUs.
Stock options granted under the 2010 Plan are granted in general at a price not less than 100% of the fair market value of the common stock on the date of grant. Stock options issued under the 2010 Plan through 2016 generally vest 25% on the first anniversary of the vesting commencement date and on a monthly basis thereafter for a period of an additional three years. Stock options granted during 2017 vest 25% on the first anniversary of the vesting commencement date and on a quarterly basis thereafter for a period of an additional three years. The options have a maximum term of ten years.
Each RSU granted under the 2010 Plan represents a right to receive one share of the Company's common stock (subject to adjustment for certain specified changes in the capital structure of the Company) upon the completion of a specific period of continued service. The majority of RSUs granted vest over four years.
In February 2016, the Company granted 0.6 million shares of PRSUs to its executives. These particular performance-based awards contained a one-year performance period and a subsequent two-year service period. The

performance target was based on the Company's revenue during the performance period and accounted for as a performance condition. In February 2017, the Compensation Committee of the Company's Board of Directors determined that the performance condition related to PRSUs granted to executives in 2016 was met based on the Company's actual revenue recognized during 2016. As such, each PRSU award vested in respect to 50% of the PRSUs subject to the award in February 2017; and 25% will vest in February 2018 and

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25% will vest in February 2019, subject to the executive's continuous service with the Company from the grant date through the remaining vesting date.

In August 2017, the Company granted 1.2 million shares of performance-based stock option awards to its executives. These performance-based stock option awards contained a one-year performance period and a subsequent three-year service period. The performance target was based on a combination of the Company's fiscal year 2017 revenue and non-GAAP operating income and was accounted for as a performance condition. In February 2018, the Compensation Committee of the Company's Board of Directors concluded that the performance target was not met and all such performance-based stock options were forfeited and canceled.

In October 2017, in connection with the hiring of its Chief Financial Offer, the Company made an "inducement" award of non-qualified stock options to purchase 0.3 million shares of the Company's common stock with an exercise price of $5.05 per share, equal to the grant date fair value based upon the closing price of the Company's common stock. The stock option was granted outside the terms of the Company's 2010 Equity Incentive Award Plan (under the employee inducement award exemption under the New York Stock Exchange Listed Company Manual Rule 303A.08). The stock option will vest and become exercisable over four years from the date of grant, with 25% of the shares vesting on the one-year anniversary of the grant date and the remaining shares vesting quarterly thereafter over the next three years, subject to continued employment with the Company.

In December 2017, the Company granted 1.6 million shares of performance-based stock option awards to its executives. These performance-based stock option awards contain a one-year performance period and a subsequent two-year service period. The performance target is based on the Company's non-GAAP operating income during the performance period and accounted for as a performance condition. After the one-year performance period, if the performance target is met and subject to certification by the Compensation Committee of the Company's Board of Directors, each performance-based stock option award shall vest with respect to 50% of the earned shares on January 1, 2019 and 6.25% of the earned shares quarterly thereafter, subject to the executive's continuous service with the Company from the grant date through the respective vesting dates. If the performance target is not met, all such performance-based stock options shall be immediately forfeited and canceled.

Stock Options

The following table summarizes the activity of stock options under the Company's equity incentive plans (in thousands, except per share data):

| Stock Options | Number of Shares | Weighted-Average Exercise Price Per Share | Weighted-Average Remaining Contractual Life (in years) | Aggregate Intrinsic Value [(1)] |
|---|---|---|---|---|
| Outstanding as of December 31, 2016 | 3,209 | $ 10.14 | | |
| Granted | 3,527 | 6.31 | | |
| Exercised | (11 ) | 5.68 | | |
| Forfeited | (13 ) | 8.38 | | |
| Expired | (956 ) | 12.72 | | |
| Outstanding as of December 31, 2017 | 5,756 | $ 7.38 | 7.1 | $ 328 |
| Vested and expected to vest as of December 31, 2017 | 2,857 | $ 8.39 | 8.1 | $ 295 |
| Options exercisable as of December 31, 2017 | 1,753 | $ 9.46 | 5.6 | $ 34 |

(1) Amounts represent the difference between the exercise price and the fair market value of common stock at December 31, 2017 of $5.95 per share for all in the money options outstanding.

During the years ended December 31, 2017, 2016 and 2015, total intrinsic value of stock options exercised was $10 thousand, $5 thousand and $0.3 million, respectively. Total cash received from employees as a result of stock option exercises in 2017, 2016 and 2015 was $0.1 million, $17 thousand and $0.6 million, respectively. Total fair values of stock options vested during 2017, 2016 and 2015 were $2.1 million, $1.9 million and $2.8 million, respectively.

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Restricted Stock Units and Performance Restricted Stock Units

The following table summarizes the activities of the Company's RSUs and PRSUs under the Company's equity incentive plans (in thousands, except per share data):

| | RSUs | | PRSUs | |
|---|---|---|---|---|
| | Number of Shares | Weighted-Average Grant Date Fair Value Per Share | Number of Shares | Weighted-Average Grant Date Fair Value Per Share |
| Outstanding at December 31, 2016 | 2,598 | $ 7.86 | 565 | $ 7.51 |
| Granted | 505 | 6.75 | — | — |
| Vested | (1,072) | 7.92 | (325) | 7.42 |
| Canceled | (305) | 7.70 | (90) | 8.01 |
| Outstanding at December 31, 2017 | 1,726 | $ 7.53 | 150 | $ 7.42 |

Upon vesting of certain RSUs and PRSUs, the Company withheld shares with value equivalent to the employees' minimum statutory obligation for the applicable income and other employment taxes and remitted the cash to the appropriate taxing authorities. The number of shares withheld was based on the value of the RSUs or PRSUs on their vesting date as determined by the Company's closing stock price. The withheld shares are reserved for future grant and issuance under the 2010 Plan.

Employee Stock Purchase Plans

The Company's ESPP allows employees to purchase shares of the Company's common stock through payroll deductions of up to 15 percent of their annual compensation subject to certain Internal Revenue Code limitations. In addition, no participant may purchase more than 2,000 shares of common stock in each offering period.

The offering periods under the ESPP are six-month periods. In July 2016, the Compensation Committee of the Company's Board of Directors approved a change in those six-month period commencement dates to May 15 and November 15 of each year, effective May 15, 2017. The ending date of the ESPP offering period commencing on November 2, 2016 was extended until May 14, 2017 as a result of this change. The price of common stock purchased under the ESPP is 85 percent of the lower of the fair market value of the common stock on the commencement date and exercise date of each six-month offering period.

The ESPP provides for the issuance of a maximum of 7.3 million shares of common stock. For the year ended December 31, 2017, shares totaling 0.7 million were purchased and issued. As of December 31, 2017, there were 2.5 million shares available for issuance.

On March 30, 2017, the Company's Board of Directors, upon recommendation of the Compensation Committee, approved the adoption of the Nonqualified ESPP. The Nonqualified ESPP was approved by the Company's stockholders on May 17, 2017, with the initial offering period commencing July 1, 2017. Under the Nonqualified ESPP, eligible employees can purchase shares of the Company's common stock through payroll deductions of up to 25 percent of their annual compensation. Eligible employees have the right to (a) purchase the maximum number of whole shares of common stock that can be purchased with the elected payroll deductions during each offering period for which the employee is enrolled at a purchase price equal to the closing price of the Company's common stock on the last day of such offering period and (b) receive an equal number of shares of the Company's common stock that are subject to a risk of forfeiture in the event the employee terminates employment within the one year period immediately following the purchase date. The Nonqualified ESPP provides two six-month offering periods, from January 1 through June 30 and July 1 through December 31 of each year. The maximum number of shares of common stock authorized for issuance under the Nonqualified ESPP as of December 31, 2017 was 1.0 million shares, with a maximum of 0.5 million shares allocated per purchase period. During the year ended December 31, 2017, shares totaling 0.2 million were purchased and issued, with an additional equal number of shares issued subject to a risk of forfeiture. As of December 31, 2017, there were 0.6 million shares available for future issuance.

Stock-Based Compensation

Stock-based compensation expense associated with stock options, RSUs, PRSUs and purchase rights under the Company's ESPP and Nonqualified ESPP is measured at the grant date based on the fair value of the award, and is recognized, net of forfeitures, as expense over the remaining requisite service period on a straight-line basis. During the years ended December 31, 2017, 2016 and 2015, the Company recorded stock-based compensation expense of $12.4 million, $14.3 million and $13.8 million, respectively.

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The following table summarizes the weighted-average grant date fair values of the Company's stock-based awards granted in the periods indicated:

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Stock options | $3.19 | $3.58 | $4.56 |
| RSUs | $6.75 | $6.91 | $8.59 |
| PRSUs | N/A | $7.42 | N/A |
| ESPP | $1.76 | $1.92 | $2.03 |
| Nonqualified ESPP | $6.90 | N/A | N/A |

The Company values the RSUs and employee stock purchase right under the Nonqualified ESPP at the closing market price of the Company's common stock on the date of grant.

Stock-based compensation expense associated with PRSUs and performance-based stock option awards with graded vesting features and which contain both a performance and a service condition is only recognized if the Company has determined that it is probable that the performance condition will be met. The Company reassesses the probability of vesting at each reporting period and adjusts compensation expense based on its probability assessment. The probability of meeting the performance condition related to performance-based stock option awards granted to executives in August 2017 and December 2017 was assessed as not probable as of December 31, 2017; as such, no stock-based compensation expense was recognized for these performance-based stock option awards as of December 31, 2017.

The Company estimates the fair value of stock options and employee stock purchase right under the ESPP at the grant date using the Black-Scholes option-pricing model. This model requires the use of the following assumptions:

(i) Expected volatility of the Company's common stock – The Company computes its expected volatility assumption based on a blended volatility (50% historical volatility and 50% implied volatility from traded options on the Company's common stock). The selection of a blended volatility assumption was based upon the Company's assessment that a blended volatility is more representative of the Company's future stock price trend as it weighs the historical volatility with the future implied volatility.

(ii) Expected life of the option award – Represents the weighted-average period that the stock options are expected to remain outstanding. The Company's computation of expected life utilizes the simplified method in accordance with Staff Accounting Bulletin No. 110 ("SAB 110") due to the lack of sufficient historical exercise data to provide a reasonable basis upon which to estimate expected term. The mid-point between the vesting date and the expiration date is used as the expected term under this method.

(iii) Expected dividend yield – Assumption is based on the Company's history of not paying dividends and no future expectations of dividend payouts.

(iv) Risk-free interest rate – Based on the U.S. Treasury yield curve in effect at the time of grant with maturities approximating the grant's expected life.

The following table summarizes the weighted-average assumptions used in estimating the grant-date fair value of stock options and of each employee's purchase right under the ESPP in the periods indicated:

| | Years Ended December 31, | | |
|---|---|---|---|
| Stock Options | 2017 | 2016 | 2015 |
| Expected volatility | 52 % | 53 % | 52 % |
| Expected life (years) | 5.88 | 6.25 | 6.25 |
| Expected dividend yield | — | — | — |
| Risk-free interest rate | 2.10% | 1.60% | 1.56% |

| | Years Ended December 31, | | |
|---|---|---|---|
| ESPP | 2017 | 2016 | 2015 |

| | | | |
|---|---|---|---|
| Expected volatility | 45 % | 46 % | 46 % |
| Expected life (years) | 0.49 | 0.52 | 0.46 |
| Expected dividend yield | — | — | — |
| Risk-free interest rate | 1.24 % | 0.47 % | 0.18 % |

In addition, the Company applies an estimated forfeiture rate to awards granted and records stock-based compensation expense only for those awards that are expected to vest. Forfeiture rates are estimated at the time of grant based on the Company’s

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historical experience. Further, to the extent the Company's actual forfeiture rate is different from management's estimate, stock-based compensation is adjusted accordingly.

As of December 31, 2017, unrecognized stock-based compensation expenses by award type, net of estimated forfeitures, and their expected weighted-average recognition periods are summarized in the following table (in thousands).

| | December 31, 2017 | | | |
|---|---|---|---|---|
| | Stock Option | RSU | PRSU | ESPP Plans |
| Unrecognized stock-based compensation expense | $3,766 | $8,431 | $222 | $1,689 |
| Weighted-average amortization period (in years) | 2.8 | 1.9 | 0.7 | 0.7 |

The Company expects to recognized stock-based compensation expense of $8.1 million in 2018, $3.6 million in 2019, $2.0 million in 2020 and $0.4 million in 2021.

Common Stock Warrants

Warrants to purchase convertible preferred stock that did not expire at the close of the Company's initial public offering, in March 2010, converted to warrants to purchase common stock at the applicable conversion rate for the related preferred stock. All warrants outstanding as of December 31, 2016 expired unexercised in September 2017.

Shares Reserved for Future Issuance

The Company had common shares reserved for future issuance as follows (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Stock options outstanding | 5,756 | 3,209 |
| Restricted stock units outstanding | 1,726 | 2,598 |
| Performance restricted stock units outstanding | 150 | 565 |
| Shares available for future grant under 2010 Plan | 281 | 1,603 |
| Shares available for future issuance under ESPP | 2,456 | 119 |
| Shares available for future issuance under Nonqualified ESPP | 551 | — |
| Common stock warrants | — | 15 |
| | 10,920 | 8,109 |

9. Employee Benefit Plan

The Company sponsors a 401(k) tax-deferred savings plan for all employees who meet certain eligibility requirements. Participants may contribute, on a pre-tax basis, a percentage of their annual compensation, but not to exceed a maximum contribution amount pursuant to Section 401(k) of the Internal Revenue Code. The Company, at the discretion of the Board of Directors, may make additional matching contributions on behalf of the participants. The Company made matching contributions totaling $3.0 million, $2.1 million and $1.8 million in 2017, 2016 and 2015, respectively.

10. Accumulated Other Comprehensive Loss

The table below summarizes the changes in accumulated other comprehensive loss by component:

| | Unrealized Gains and Losses on Available-for-Sale Marketable Securities | Foreign Currency Translation Adjustments | Total |
|---|---|---|---|
| Balance at December 31, 2015 | (94) | (101) | (195) |
| Other comprehensive income (loss) | 88 | (549) | (461) |
| Balance at December 31, 2016 | (6) | (650) | (656) |
| Other comprehensive income | 6 | 481 | 487 |
| Balance at December 31, 2017 | $ — | $ (169) | $(169) |

Realized gains and losses on sales of available-for-sale marketable securities, if any, are reclassified from accumulated other comprehensive loss to “Other income (expense), net” in our Consolidated Statements of Comprehensive Loss.

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11. Income Taxes

The domestic and foreign components of loss before provision for incomes taxes were as follows (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Domestic | $(84,387) | $(28,931) | $(27,674) |
| Foreign | 2,598 | 1,876 | 1,876 |
| | $(81,789) | $(27,055) | $(25,798) |

Provision for income taxes consisted of the following (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Current: | | | |
| State | $115 | $102 | $90 |
| Foreign | 577 | 673 | 493 |
| Current income tax | 692 | 775 | 583 |
| Deferred: | | | |
| Foreign | 551 | (428) | (48) |
| Deferred income tax | 551 | (428) | (48) |
| | $1,243 | $347 | $535 |

The differences between the statutory tax rate and the effective tax rate, expressed as a percentage of loss before income taxes, were as follows:

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Federal statutory rate | 34.0 % | 34.0 % | 34.0 % |
| State statutory rate | 4.5 % | 6.1 % | 2.6 % |
| Foreign operations | 0.5 % | 0.6 % | 1.1 % |
| R&D tax credits | 2.7 % | 6.4 % | 11.2 % |
| Foreign income inclusion | (0.1 )% | (0.7 )% | (2.4 )% |
| Non-deductible stock compensation | (3.7 )% | (5.1 )% | (1.9 )% |
| Other permanent items | (0.4 )% | (1.4 )% | (2.0 )% |
| Tax true-up | (1.7 )% | 21.0 % | (1.3 )% |
| Valuation allowance | 67.3 % | (62.2)% | (43.4)% |
| Tax reform | (104.6)% | — % | — % |
| Effective tax rate | (1.5 )% | (1.3 )% | (2.1 )% |

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The significant components of the Company's deferred tax assets and liabilities were as follows (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Deferred tax assets: | | |
| Net operating loss carryforwards | $134,731 | $167,668 |
| Tax credit carryforwards | 43,095 | 36,026 |
| Depreciation and amortization | 1,892 | 2,538 |
| Accruals and reserves | 7,933 | 13,462 |
| Deferred revenue | 7,928 | 12,954 |
| Stock-based compensation | 3,100 | 6,159 |
| Intangible assets | 64 | — |
| Other | 23 | 1,124 |
| Gross deferred tax assets | 198,766 | 239,931 |
| Valuation allowance | (198,746 ) | (239,238 ) |
| Net deferred tax assets | 20 | 693 |
| Deferred tax liability - intangible assets | — | (157 ) |
| | $20 | $536 |

All deferred tax assets, along with any related valuation allowance, and net of all deferred tax liabilities are classified in the consolidated balance sheet as long-term.

Management reviews the recognition of deferred tax assets to determine if realization of such assets is more likely than not. The realization of the Company's deferred tax assets is dependent upon future earnings. The Company has been in a cumulative loss position since inception, which represents a significant piece of negative evidence. Using the more likely than not criteria specified in the applicable accounting guidance, this negative evidence cannot be overcome by positive evidence currently available to the Company and as a result the Company has established a full valuation allowance against its deferred tax assets with the exception of certain foreign deferred tax assets. The Company's valuation allowance decreased by $40.5 million in 2017 and increased by $16.8 million in 2016.

As of December 31, 2017, the Company had U.S. federal and state net operating losses of approximately $604.1 million and $210.2 million, respectively. The U.S. federal net operating loss carryforwards will expire at various dates beginning in 2019 and through 2037 if not utilized. The state net operating loss carryforwards will expire at various dates beginning in 2018 and through 2037, if not utilized. Additionally, the Company has U.S. federal, California and other U.S. states research and development credits of approximately $31.0 million, $33.4 million and $3.2 million, respectively, as of December 31, 2017. The U.S. federal research and development credits will begin to expire in 2020 and through 2036 and the California research and development credits have no expiration date. The credits related to other various U.S. states will begin to expire in 2018 and through 2032. Based on current activity during 2017, the Company does not anticipate to have further adjustments or limitations to the Company's net operating loss carryforwards.

Uncertain Tax Positions

ASC Topic 740, "Income Taxes," prescribes a recognition threshold and measurement attribute to the financial statement recognition and measurement of a tax position taken or expected to be taken in a tax return. The guidance also provides guidance on derecognition, classification, accounting in interim periods and disclosure requirements for uncertain tax positions. The standard requires the Company to recognize the financial statement effects of an uncertain tax position when it is more likely than not that such position will be sustained upon audit. The Company recognizes accrued interest and penalties related to unrecognized tax benefits as interest expense and income tax expense, respectively, in statements of comprehensive loss.

The following table reconciles the Company's unrecognized tax benefits (in thousands):

| | Years Ended December 31, | |
|---|---|---|
| | 2017 | 2016 |
| Balance at beginning of year | $18,349 | $16,597 |

| | | |
|---|---|---|
| Additions for tax positions related to prior year | — | 420 |
| Reductions for tax positions related to prior year | — | (145) |
| Additions for tax positions related to current year | 1,940 | 1,477 |
| Balance at end of year | $20,289 | $18,349 |

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As of December 31, 2017 and 2016, the Company had unrecognized tax benefits of $20.3 million and $18.3 million, respectively, none of which would affect the Company’s effective tax rate if recognized. There were no accrued interest or penalties for uncertain income tax as of December 31, 2017.

The Company files tax returns in the United State and various state jurisdictions, the United Kingdom, China and Brazil. The tax years 1999 through 2016 remain open and subject to examination by the appropriate governmental agencies in the U.S. due to tax attribute carryforwards.

U.S. Tax Reform

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the “Tax Act”). The Tax Act makes broad and complex changes to the U.S. tax code including but not limited to (1) reducing the U.S. federal corporate tax rate from 34% to 21%; (2) requiring companies to pay a one-time transition tax on certain repatriated earnings of foreign subsidiaries; (3) generally eliminating U.S. federal income taxes on dividends from foreign subsidiaries; (4) requiring a current inclusion in U.S. federal income of certain earnings of controlled foreign corporations; (5) creating a new limitation on deductible interest expense; and (6) changing rules related to the uses and limitations of net operating loss carryforwards created in tax years beginning after December 31, 2017.

On December 22, 2017, the SEC staff issued Staff Accounting Bulletin No. 118 (“SAB 118”), which provides guidance on accounting for the tax effects of the Tax Act. SAB 118 provides a measurement period that should not extend beyond one year from the Tax Act enactment date for companies to complete the accounting under ASC 740, Income taxes. In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. To the extent that a company’s accounting for certain income tax effects of the Tax Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements.

There are also certain transitional impacts of the Tax Act. As part of the transition to the new territorial tax system, the Tax Act imposes a one-time repatriation tax on deemed repatriation of historical earnings of foreign subsidiaries. These transitional impacts resulted in a provisional net income inclusion of $1.1 million for the year ended December 31, 2017. The one-time transition tax is based on post-1986 earnings and profits that were previously deferred from U.S. income tax. While the Company has not yet finalized its calculation of the total post-1986 earnings and profits for its foreign corporations or the impact of foreign tax credits, it has prepared a reasonable estimate and calculated the provision amount. The Company is continuing to evaluate the calculation and accounting of the transition tax, which may change as the Company's interpretation of the provisions of the Tax Act evolve, additional information becomes available or interpretive guidance is issued by the U.S. Treasury. The final determination will be completed no later than one year from the enactment date. Based on current year and carryover losses and valuation allowance, the Company does not expect an impact to its consolidated financial statements upon completion of the analysis.

In addition, the reduction of U.S. federal corporate tax rate reduces the corporate tax rate to 21%, effective January 1, 2018. Consequently, the Company has accounted for the reduction of $84.4 million of deferred tax assets with an offsetting adjustment to the valuation allowance in the year ended December 31, 2017, which is reflected in the disclosures presented above.

12. Net Loss Per Common Share

The following table sets forth the computation of basic and diluted net loss per common share for the periods indicated (in thousands, except per share data):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| Numerator: | | | |
| Net loss | $(83,032) | $(27,402) | $(26,333) |
| Denominator: | | | |
| Weighted-average common shares outstanding | 50,155 | 48,730 | 51,489 |
| Basic and diluted net loss per common share | $(1.66) | $(0.56) | $(0.51) |
| Potentially dilutive shares, weighted-average | 3,446 | 5,890 | 6,120 |

For the year ended December 31, 2017 and for the year ended December 31, 2015, unvested restricted stock awards are included in the calculation of basic weighted-average shares because such shares are participating securities; however, the impact was immaterial. There were no unvested restricted stock awards during the year ended December 31, 2016.

Potentially dilutive shares have been excluded from the computation of diluted net loss per common share when their effect is antidilutive. These antidilutive shares were primarily from stock options, restricted stock units and performance restricted stock

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units. For each of the periods presented where the Company reported a net loss, the effect of all potentially dilutive securities would be antidilutive, and as a result diluted net loss per common share is the same as basic net loss per common share.

## 13. Segment Information

The Company develops, markets and sells communications access systems and software, and there are no segment managers who are held accountable for operations, operating results and plans for levels or components below the Company unit level. Accordingly, the Company is considered to be in a single reporting segment and operating unit structure. The Company's chief operating decision maker is the Company's Chief Executive Officer, who reviews financial information presented on a Company-wide basis, for purposes of allocating resources and evaluating financial performance.

Geographic Information:

The following is a summary of revenue by geographic region based upon the location of the customers (in thousands):

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2017 | 2016 | 2015 |
| United States | $452,956 | $415,629 | $360,077 |
| Caribbean | 9,853 | 12,934 | 13,358 |
| Canada | 13,105 | 9,064 | 10,198 |
| Europe | 6,575 | 6,334 | 11,090 |
| Other | 27,878 | 14,826 | 12,740 |
| | $510,367 | $458,787 | $407,463 |

The Company's property and equipment, net of accumulated depreciation, are located in the following geographical areas (in thousands):

| | December 31, | |
|---|---|---|
| | 2017 | 2016 |
| United States | $13,109 | $15,321 |
| China | 2,572 | 2,663 |
| | $15,681 | $17,984 |

## 14. Restructuring Plan

The Company adopted a restructuring plan in March 2017. This restructuring plan realigns the Company's business, increasing its focus towards its investments in software defined access and cloud products, while reducing its expense structure in its traditional systems business. The Company began to take actions under this plan beginning in March 2017 and recognized $4.2 million of restructuring charges for the year ended December 31, 2017 consisting primarily of severance and other one-time termination benefits. Restructuring charges are presented separately under operating expenses in the accompanying Consolidated Statements of Comprehensive Loss.

The following table summarizes the activities related to the restructuring charges pursuant to the above restructuring plan (in thousands):

| | Severance and Related Benefits | Facilities | Total |
|---|---|---|---|
| Balance at December 31, 2016 | $ — | $ — | $— |
| Restructuring charges for the year | 3,807 | 442 | 4,249 |
| Cash payments | (2,832 ) | — | (2,832 ) |
| Balance at December 31, 2017 | $ 975 | $ 442 | $1,417 |

Actions pursuant to this restructuring plan were complete as of December 31, 2017. Any changes to the estimates of executing the restructuring plan will be reflected in our future results of operations.

## 15. Subsequent Events

The Company established a new restructuring plan in early 2018 to further realign its business resources based on the production releases of its platform offerings. The Company expects to incur restructuring charges of approximately

$4.0 million, consisting of primarily of severance and other termination related benefits, in the first quarter of 2018.

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In February 2018, the Company sold its outdoor cabinet product line to Clearfield, Inc. for $10.4 million in cash and the assumption by Clearfield of the related product warranty liabilities and open purchase order commitments with its contract manufacturer.

In March 2018, the Company entered into a new office lease agreement for 65,000 square feet in San Jose, California as its current office lease in San Jose, California expires in August 2018. The lease commences in August 2018 for a term of 87 months. The future minimum lease obligations under the lease are $16.1 million.

16. Quarterly Financial Data—Unaudited

The Company's fiscal year begins on January 1st and ends on December 31st. Quarterly periods are based on a 4-4-5 fiscal calendar with the first, second and third fiscal quarters ending on the 13th Saturday of each fiscal period. As a result, the Company had five more days in the first quarter of 2017 and six fewer days in the fourth quarter of 2017 than in the respective 2016 periods.

The following table presents selected unaudited quarterly financial data of the Company (in thousands, except per share data). The Company's quarterly results of operations for these periods are not necessarily indicative of future results of operations.

| | Fiscal Year 2017 Quarter Ended | | | |
|---|---|---|---|---|
| | April 1 | July 1 | September 30 | December 31 |
| Revenue | $117,518 | $126,123 | $128,827 | $137,899 |
| Gross profit | 34,377 | 43,323 | 44,633 | 50,557 |
| Operating loss | (32,816) | (18,714) | (17,263) | (12,763) |
| Net loss | (33,325) | (18,988) | (17,853) | (12,866) |
| Net loss per common share, basic | $(0.67) | $(0.38) | $(0.35) | $(0.25) |
| Net loss per common share, diluted | $(0.67) | $(0.38) | $(0.35) | $(0.25) |

| | Fiscal Year 2016 Quarter Ended | | | |
|---|---|---|---|---|
| | March 26 | June 25 | September 24 | December 31 |
| Revenue | $98,375 | $107,425 | $121,187 | $131,800 |
| Gross profit | 45,482 | 50,006 | 53,544 | 52,186 |
| Operating income (loss) | (10,738) | (5,881) | 735 | (12,235) |
| Net income (loss) | (10,729) | (5,826) | 636 | (11,483) |
| Net income (loss) per common share, basic | $(0.22) | $(0.12) | $0.01 | $(0.23) |
| Net income (loss) per common share, diluted | $(0.22) | $(0.12) | $0.01 | $(0.23) |

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## ITEM 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

There were no changes in nor any disagreements with accountants on accounting principles or practices, financial statement disclosure, auditing scope or procedures, or other reportable events requiring disclosure pursuant to Item 304(b) of Regulation S-K.

## ITEM 9A. Controls and Procedures

### Evaluation of Disclosure Controls and Procedures

As of the end of the period covered by this report, which we refer to as the evaluation date, we carried out an evaluation under the supervision and with the participation of management, including our principle executive officer and principle financial officer, of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act).

The purpose of this evaluation was to determine whether as of the evaluation date our disclosure controls and procedures were effective to provide reasonable assurance that the information we are required to disclose in our filings with the SEC, (i) is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms and (ii) accumulated and communicated to our management, including our principal executive officer and our principal financial officer, as appropriate to allow timely decisions regarding required disclosure. Based upon this evaluation, our principal executive officer and our principal financial officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this report.

### Management’s Report on Internal Control Over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting. Our internal control over financial reporting is 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. 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. Management has evaluated the effectiveness of our internal control over financial reporting as of December 31, 2017 using the criteria set forth in the Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission, or COSO, (2013 framework). Based on our evaluation, management has concluded that we maintained effective control over financial reporting as of December 31, 2017 based on the COSO criteria. The effectiveness of our internal control over financial reporting as of December 31, 2017 has been audited by KPMG LLP, an independent registered public accounting firm, as stated in their report included in this Annual Report on Form 10-K.

### Limitations on the Effectiveness of Controls

Our disclosure controls and procedures provide our principal executive officer and our principal financial officer reasonable assurances that our disclosure controls and procedures will achieve their objectives. However, our management, including our principal executive officer and our principal financial officer, does not expect that our disclosure controls and procedures or our internal control over financial reporting can or will prevent all human error. A control system, no matter how well designed and implemented, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Furthermore, the design of a control system must reflect the fact that there are internal resource constraints, and the benefit of controls must be weighed relative to their corresponding costs. Because of the limitations in all control systems, no evaluation of controls can provide complete assurance that all control issues and instances of error, if any, within our company are detected. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur due to human error or mistake. Additionally, controls, no matter how well designed, could be circumvented by the individual acts of specific persons within the organization. The design of any system of controls is also 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 objectives under all potential future conditions.

### Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this report that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. Other Information

None.

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## PART III

### ITEM 10. Directors, Executive Officers and Corporate Governance

Information required by this Item 10 relating to our directors is incorporated by reference to the information set forth under the captions “Proposal No. 1—Election of Directors” and “Director Compensation” and in other applicable sections of the Proxy Statement for the 2018 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A of the Exchange Act, or the Proxy Statement, to be filed within 120 days of the end of the fiscal year covered by this Report. Information required by this Item 10 relating to our officers is incorporated by reference to the information set forth under the captions “Executive Officers” and “Executive Compensation” and in other applicable sections of the Proxy Statement. Information regarding our Section 16 reporting compliance is incorporated by reference to the information set forth under the captions “Security Ownership of Certain Beneficial Owners and Management” and “Section 16(a) Beneficial Ownership Reporting Compliance” of the Proxy Statement.

We have adopted a code of ethics, which applies to all employees, officers and directors of Calix. The Code of Business Conduct and Ethics meets the requirements of a “code of ethics” as defined by Item 406 of Regulation S-K, and applies to our Chief Executive Officer, Chief Financial Officer and all other employees, as indicated above. The Code of Business Conduct and Ethics also meets the requirements of a code of conduct under NYSE listing standards. The Code of Business Conduct and Ethics is posted on our website at www.calix.com under the links “About Calix—Investor Relations—Corporate Governance—Code of Conduct.” We intend to disclose any amendments to the Code of Business Conduct and Ethics, as well as any waivers for executive officers or directors, on our website at www.calix.com.

### ITEM 11. Executive Compensation

Information required by this Item 11 relating to executive compensation and other matters is incorporated by reference to the information set forth under the caption “Compensation Discussion and Analysis” and in other applicable sections of the Proxy Statement.

### ITEM 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Information required by this Item 12 relating to security ownership of certain beneficial owners and management and related stockholder matters is incorporated by reference to the information set forth under the caption “Security Ownership of Certain Beneficial Owners and Management” and in other applicable sections of the Proxy Statement. Information regarding securities authorized for issuance under our equity compensation plans is incorporated by reference to the information set forth under the caption “Equity Compensation Plan Information” of the Proxy Statement.

### ITEM 13. Certain Relationships and Related Transactions, and Director Independence

Information required by this Item 13 relating to certain relationships and related transactions and director independence is incorporated by reference to the information set forth under the caption “Certain Relationships and Related Transactions” and in other applicable sections of the Proxy Statement.

### ITEM 14. Principal Accountant Fees and Services

Information required by this Item 14 relating to principal account fees and services is incorporated by reference to the information set forth under the caption “Principal Accountant Fees and Services” of the Proxy Statement.

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PART IV

ITEM 15. Exhibits, Financial Statement Schedules

(a) The following documents are filed as part of this Report:

1. Consolidated Financial Statements

The consolidated financial statements of Calix and the reports of independent registered public accounting firms thereon are set forth under Part II, Item 8 of this report.



2. Consolidated Financial Statement Schedules

All schedules have been omitted because they are not applicable, not required, not presently in amounts sufficient to require submission of the schedule, or the information required to be set forth therein is included in the consolidated financial statements or notes thereto.

3. Exhibits

The following exhibits are filed with or incorporated by reference in this report. Where such filing is made by incorporation by reference to a previously filed registration statement or report, such registration statement or report is identified in parentheses. We will furnish any exhibit upon request to: Calix Investor Relations, Thomas J. Dinges at Tom.Dinges@calix.com.

| Exhibit Number | Description |
|---|---|
| 2.1 | Agreement and Plan of Merger and Reorganization, dated as of September 16, 2010, by and among Calix, Inc., Ocean Sub I, Inc., Ocean Sub II, LLC, Occam Networks, Inc. (filed as Exhibit 2.1 to Calix's Registration Statement on Form S-4 originally filed with the Securities and Exchange Commission on November 2, 2010 (File No. 333-170282), as amended by Amendment No. 1 filed December 14, 2010, as amended by Post-Effective Amendment No. 1, filed December 14, 2010 and as amended by Post-Effective Amendment No. 2, filed February 7, 2011 and incorporated by reference). |
| 3.1 | Amended and Restated Certificate of Incorporation of Calix, Inc. (filed as Exhibit 3.3 to Amendment No. 7 to Calix's Registration Statement on Form S-1 filed with the Securities and Exchange Commission on March 23, 2010 (File No. 333-163252) and incorporated by reference). |
| 3.2 | Amended and Restated Bylaws of Calix, Inc. (filed as Exhibit 3.5 to Amendment No. 7 to Calix's Registration Statement on Form S-1 filed with the Securities and Exchange Commission on March 23, 2010 (File No. 333-163252) and incorporated by reference). |
| 4.1 | Form of Calix, Inc.'s Common Stock Certificate (filed as Exhibit 4.1 to Amendment No. 7 to Calix's Registration Statement on Form S-1 filed with the Securities and Exchange Commission on March 23, 2010 (File No. 333-163252) and incorporated by reference). |
| 10.1* | Calix Networks, Inc. Amended and Restated 2002 Stock Plan and related documents (filed as Exhibit 10.2 to Amendment No. 6 to Calix's Registration Statement on Form S-1 filed with the SEC on March 8, 2010 (File No. 333-163252) and incorporated by reference). |
| 10.2* | Calix, Inc. 2010 Equity Incentive Award Plan and related documents (filed as Exhibit 10.4 to Amendment No. 6 to Calix's Registration Statement on Form S-1 filed with the SEC on March 8, 2010 (File No. 333-163252) and incorporated by reference). |
| 10.3 | Form of Indemnification Agreement made by and between Calix, Inc. and each of its directors, executive officers and some employees (filed as Exhibit 10.5 to Amendment No. 6 to Calix's Registration Statement on Form S-1 filed with the SEC on March 8, 2010 (File No. 333-163252) and incorporated by reference). |

| | |
|---|---|
| 10.4 | Lease between RNM Lakeville, LLC and Calix, Inc. dated February 13, 2009 (filed as Exhibit 10.6 to Calix's Registration Statement on Form S-1 filed with the SEC on November 20, 2009 (File No. 333-163252) and incorporated by reference). |

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| Exhibit Number | Description |
|---|---|
| 10.5 | First Amendment to Lease by and between 1031, 1035, 1039 North McDowell, LLC and Calix, Inc. effective January 28, 2013 (filed as Exhibit 10.25 to Calix's Form 10-K filed with the SEC on February 22, 2013 (File No. 001-34674) and incorporated by reference). |
| 10.6 | Credit Agreement among Calix, Inc., certain of its subsidiaries, Bank of America, N.A. and the other lenders party thereto dated July 29, 2013 (filed as Exhibit 10.1 to Calix's Form 10-Q filed with the SEC on August 6, 2013 (File No. 001-34674) and incorporated by reference). |
| 10.7 | First Amendment to Credit Agreement dated as of December 23, 2015 by and among Calix, Inc. and Bank of America, N.A. as administrative agent and lender (filed as Exhibit 10.1 to Calix's Form 8-K filed with the SEC on December 28, 2015 (File No. 001-34674) and incorporated by reference). |
| 10.8* | Offer Letter between Calix, Inc. and Carl Russo dated November 1, 2006 (filed as Exhibit 10.8 to Amendment No. 1 to Calix's Registration Statement on Form S-1 filed with the SEC on December 31, 2009 (File No. 333-163252) and incorporated by reference). |
| 10.9* | Offer Letter between Calix, Inc. and William Atkins dated December 21, 2013 (filed as Exhibit 10.15 to Calix's Form 10-K filed with the SEC on February 20, 2014 (File No. 001-34674) and incorporated by reference). |
| 10.10† | Asset Purchase Agreement between Ericsson Inc. and Calix, Inc. dated August 20, 2012 (filed as Exhibit 10.1 to Calix's Form 10-Q/A filed with the SEC on December 18, 2012 (File No. 001-34674) and incorporated by reference). |
| 10.11* | Calix, Inc. Non-Employee Director Restricted Stock Unit Deferred Compensation Plan, effective January 1, 2013 (filed as Exhibit 10.22 to Calix's Form 10-K filed with the SEC on February 22, 2013 (File No. 001-34674) and incorporated by reference). |
| 10.12* | Calix, Inc. Management Bonus Program Under the 2010 Equity Incentive Award Plan (filed as Exhibit 10.1 to Calix's Form 8-K filed with the SEC on February 28, 2012 (File No. 001-34674) and incorporated by reference). |
| 10.13* | Calix, Inc. Long Term Incentive Program Under the 2010 Equity Incentive Award Plan (filed as Exhibit 10.2 to Calix's Form 8-K filed with the SEC on February 28, 2012 (File No. 001-34674) and incorporated by reference). |
| 10.14* | Calix, Inc. Non-Employee Director Equity Compensation Policy, as amended October 18, 2011, July 25, 2012, April 22, 2014 and April 26, 2016 (filed as Exhibit 10.18 to Calix's Form 10-K filed with the SEC on February 28, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.15* | Offer Letter by and between Calix, Inc. and Michael Weening dated May 20, 2016 (filed as Exhibit 10.1 to Calix's Form 10-Q filed with the SEC on August 3, 2016 (File No. 001-34674) and incorporated by reference). |
| 10.16* | Offer Letter by and between Calix, Inc. and Greg Billings dated December 8, 2016 (filed as Exhibit 10.24 to Calix's Form 10-K filed with the SEC on February 28, 2016 (File No. 001-34674) and incorporated by reference). |
| 10.17* | Amendment to Offer Letter by and between Calix, Inc. and Greg Billings dated August 1, 2017. |
| 10.18* | Separation Agreement and General Release of All Claims by and between Calix, Inc. and William Atkins dated March 31, 2017 (filed as Exhibit 10.1 to Calix's Form 10-Q filed with the SEC on May 10, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.19* | Consulting Agreement by and between Calix, Inc. and Cory Sindelar dated May 31, 2017 (filed as Exhibit 10.1 to Calix's Form 10-Q filed with the SEC on August 10, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.20* | Calix, Inc. Non-Employee Director Cash Compensation Policy, as amended June 1, 2017 (filed as Exhibit 10.2 to Calix's Form 10-Q filed with the SEC on August 10, 2017 (File No. 001-34674) and incorporated by reference). |

| | |
|---|---|
| 10.21* | Calix, Inc. Amended and Restated Employee Stock Purchase Plan (incorporated by reference to Appendix A to the Registrant's definitive proxy statement on Schedule 14A, filed with the SEC on April 4, 2017 (File No. 001-34674)). |
| 10.22* | Calix, Inc. 2017 Nonqualified Employee Stock Purchase Plan (incorporated by reference to Appendix B to the Registrant's definitive proxy statement on Schedule 14A, filed with the SEC on April 4, 2017 (File No. 001-34674)). |
| 10.23† | Loan and Security Agreement dated August 7, 2017 between Silicon Valley Bank and Calix, Inc. (filed as Exhibit 10.1 to Calix's Form 10-Q filed with the SEC on August 11, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.24†† | First Amendment to Loan and Security Agreement dated February 13, 2018 between Silicon Valley Bank and Calix, Inc. |
| 10.25* | Offer Letter between Calix, Inc. and Cory Sindelar dated September 28, 2017 (filed as Exhibit 10.2 to Calix's Form 10-Q filed with the SEC on August 11, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.26* | Nonstatutory Inducement Stock Option Grant Notice between Calix, Inc. and Cory Sindelar dated October 1, 2017 (filed as Exhibit 10.3 to Calix's Form 10-Q filed with the SEC on August 11, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.27* | Amended and Restated Executive Change in Control and Severance Plan effective September 6, 2017 (filed as Exhibit 10.1 to Calix's Form 8-K filed with the SEC on September 11, 2017 (File No. 001-34674) and incorporated by reference). |
| 10.28* | Amendment to Amended and Restated Executive Change in Control and Severance Plan effective October 1, 2017 (filed as Exhibit 10.5 to Calix's Form 10-Q filed with the SEC on August 11, 2017 (File No. 001-34674) and incorporated by reference). |

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| Exhibit Number | Description |
|---|---|
| 21.1 | Subsidiaries of the Registrant. |
| 23.1 | Consent of KPMG LLP, independent registered public accounting firm. |
| 23.2 | Consent of Ernst & Young LLP, independent registered public accounting firm. |
| 24.1 | Power of Attorney (included on signature page to this Annual Report on Form 10-K). |
| 31.1 | Certification of Principal Executive Officer of Calix, Inc. Pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934. |
| 31.2 | Certification of Principal Financial Officer of Calix, Inc. Pursuant to Rule 13a-14(a) of the Securities Exchange Act of 1934. |
| 32.1 | Certification of Principal Executive Officer and Principle Financial Officer of Calix, Inc. Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002. |
| 101.INS | XBRL Instance Document. |
| 101.SCH | XBRL Taxonomy Extension Schema Document. |
| 101.CAL | XBRL Taxonomy Extension Calculation Linkbase Document. |
| 101.DEF | XBRL Taxonomy Extension Definition Linkbase Document. |
| 101.LAB | XBRL Taxonomy Extension Label Linkbase Document. |
| 101.PRE | XBRL Taxonomy Extension Presentation Linkbase Document. |

* Indicates management contract or compensatory plan or arrangement.

† Confidential treatment has been granted as to certain portions of this agreement.

††Confidential treatment has been requested as to certain portions of this agreement.

ITEM 16. Form 10-K Summary

None.

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## SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

CALIX, INC.
(Registrant)

Dated: March 13, 2018 By: /s/ Carl Russo
Carl Russo
Chief Executive Officer
(Principal Executive Officer)

Dated: March 13, 2018 By: /s/ Cory Sindelar
Cory Sindelar
Chief Financial Officer
(Principal Financial Officer)

Dated: March 13, 2018 By: /s/ Sheila Cheung
Sheila Cheung
Vice President, Finance and Accounting
(Principal Accounting Officer)

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POWER OF ATTORNEY

Each person whose individual signature appears below hereby authorizes and appoints Carl Russo, Cory Sindelar and Sheila Cheung, and each of them, with full power of substitution and re-substitution and full power to act without the other, as his true and lawful attorney-in-fact and agent to act in his name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his substitute or substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities indicated on March 13, 2018.

| Signature | Title | Date |
|---|---|---|
| /s/ Carl Russo<br>Carl Russo | Chief Executive Officer and Director<br>(Principal Executive Officer) | March 13, 2018 |
| /s/ Cory Sindelar<br>Cory Sindelar | Chief Financial Officer<br>(Principal Financial Officer) | March 13, 2018 |
| /s/ Sheila Cheung<br>Sheila Cheung | Vice President, Finance and Accounting<br>(Principal Accounting Officer) | March 13, 2018 |
| /s/ Don Listwin<br>Don Listwin | Chairman of the Board of Directors | March 13, 2018 |
| /s/ Christopher Bowick<br>Christopher Bowick | Director | March 13, 2018 |
| /s/ Kathy Crusco<br>Kathy Crusco | Director | March 13, 2018 |
| /s/ Kevin DeNuccio<br>Kevin DeNuccio | Director | March 13, 2018 |
| /s/ Michael Everett<br>Michael Everett | Director | March 13, 2018 |
| /s/ Michael Flynn<br>Michael Flynn | Director | March 13, 2018 |
| /s/ Kira Makagon<br>Kira Makagon | Director | March 13, 2018 |
| /s/ Michael Matthews<br>Michael Matthews | Director | March 13, 2018 |
| /s/ Kevin Peters<br>Kevin Peters | Director | March 13, 2018 |

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