

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**
Washington, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2018

OR

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: 000-32743

DASAN ZHONG SOLUTIONS, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

22-3509099
(I.R.S. Employer
Identification No.)

7195 Oakport Street
Oakland, California 94621

(Address of principal executive office)

Registrant's telephone number, including area code: (510) 777-7000

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

Common Stock, \$0.001 Par Value

The Nasdaq Stock Market LLC

(Title of class)

(Name of each exchange on which registered)

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

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities

Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Exchange

Act. Yes No

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

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

Indicate by check mark 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.

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 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	<input type="checkbox"/>	Accelerated filer	<input type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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

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

As of March 6, 2019, there were 16,596,483 shares outstanding of the registrant's common stock, \$0.001 par value. As of June 30, 2018 (the last business day of the registrant's most recently completed second fiscal quarter), the aggregate market value of the common stock held by non-affiliates of the registrant was approximately \$51,712,507.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for its 2019 Annual Meeting of Stockholders are incorporated by reference into

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Forward-looking Statements

This Annual Report on Form 10-K, including “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”). These statements are based on current expectations, estimates, forecasts, and projections about the industries in which we operate, and reflect the beliefs and assumptions of our management as of the date hereof. We use words such as “anticipate,” “believe,” “continue,” “could,” “estimate,” “expect,” “forecast,” “goal,” “intend,” “may,” “plan,” “project,” “seek,” “should,” “target,” “will,” “would,” variations of such words, and similar expressions to identify forward-looking statements. In addition, statements that refer to projections of earnings, revenue, costs or other financial items in future periods; anticipated growth and trends in our business or key markets; cost synergies, growth opportunities and other potential financial and operating benefits of the merger with Dasan Network Solutions, Inc. and the acquisition of Keymile GmbH; future growth and revenues from our products; our ability to refinance or repay our existing indebtedness prior to the applicable maturity dates; future economic conditions and performance; anticipated performance of products or services; plans, objectives and strategies for future operations; other characterizations of future events or circumstances; and all other statements that are not statements of historical fact, are forward-looking statements within the meaning of the Securities Act and the Exchange Act. Readers are cautioned that these forward-looking statements are only predictions and are subject to assumptions and to risks and uncertainties that are difficult to predict, including those identified under the heading “Risk Factors” in Item 1A of this Annual Report on Form 10-K, and in our other filings with the Securities and Exchange Commission (the “SEC”). Our actual results may differ materially and adversely from those expressed in any forward-looking statements. Factors that might cause such a difference include, but are not limited to, our ability to realize the anticipated cost savings, synergies and other benefits of the merger with Dasan Network Solutions, Inc. and the acquisition of Keymile GmbH, any integration risks relating to the acquisition of Keymile, the ability to generate sufficient revenue to achieve or sustain profitability, our ability to raise additional capital to fund existing and future operations or to refinance or repay our existing indebtedness, defects or other performance problems in our products, any economic slowdown in the telecommunications industry that restricts or delays the purchase of our products by our customers, commercial acceptance of our products, intense competition in the communications equipment market from large equipment companies as well as private companies with products that address the same networks needs as our products, higher than anticipated expenses that we may incur, any failure to comply with the periodic report filing and other requirements of The Nasdaq Stock Market for continued listing, material weaknesses or other deficiencies in our internal control over financial reporting, the initiation of any civil litigation, regulatory proceedings, government enforcement actions or other adverse effects relating to the Audit Committee investigation or errors in the consolidated financial statements of Legacy Zhong (as defined below) and other factors identified elsewhere in this Annual Report on Form 10-K. We undertake no obligation to revise or update any forward-looking statements for any reason.

PART I

ITEM 1. BUSINESS

DASAN Zhone Solutions, Inc. (“DZS” or the “Company,” formerly known as Zhone Technologies, Inc.) was incorporated under the laws of the state of Delaware in June 1999. On September 9, 2016, DZS acquired Dasan Network Solutions, Inc. a California corporation (“DNS”), through the merger of a wholly owned subsidiary of Zhone Technologies, Inc. with and into DNS, with DNS surviving as our wholly owned subsidiary. We refer to this transaction as the “Merger.” At the effective date of the Merger, all issued and outstanding shares of capital stock of DNS held by its sole shareholder, DASAN Networks, Inc. (“DNI”), a company incorporated under the laws of the Republic of Korea (“Korea”), were canceled and converted into the right to receive shares of our common stock equal to 57.3% of our issued and outstanding common stock immediately following the Merger. In connection with the Merger, Zhone Technologies, Inc. changed its name to DASAN Zhone Solutions, Inc. The mailing address of our worldwide headquarters is 7195 Oakport Street, Oakland, California 94621, and our telephone number at that location is (510) 777-7000. As used in this Annual Report on Form 10-K, unless the context suggests otherwise, the terms “we,” “us” or “our” refer to (i) DNS and its consolidated subsidiaries for periods through September 8, 2016 and (ii) DZS and its consolidated subsidiaries for periods on or after September 9, 2016, the effective date of the Merger. For periods through September 8, 2016, Zhone Technologies, Inc. is referred to as “Legacy Zhone.”

Company Overview

We are a global provider of ultra-broadband network access solutions and communications platforms deployed by advanced Tier 1, 2 and 3 service providers and enterprise customers. Our solutions are deployed by over 900 customers in more than 80 countries worldwide. Our ultra-broadband solutions are focused on creating significant value for our customers by delivering innovative solutions that empower global communication advancement by shaping the internet connection experience. Every connection matters, and the first connection to the internet and cloud services applications matters the most. Our principal focus is centered around enabling our customers to connect everything and everyone to the internet-cloud economy via ultra-broadband connectivity solutions.

We research, develop, test, sell, manufacture and support platforms in five major areas: broadband access, mobile backhaul, Ethernet switching with Software Defined Networking (“SDN”) capabilities, new enterprise solutions based on Passive Optical LAN (“POL”), and new generation of SDN/ Network Function Virtualization (“NFV”) solutions for unified wired and wireless networks. We have extensive regional development and support centers around the world to support our customer needs.

Keymile Acquisition

On January 3, 2019, ZTI Merger Subsidiary III Inc., a Delaware corporation and our wholly owned subsidiary, acquired all of the outstanding shares of Keymile GmbH, a limited liability company organized under the laws of Germany (“Keymile”), from Riverside KM Beteiligung GmbH, also a limited liability company organized under the laws of Germany, pursuant to a share purchase agreement. We refer to this transaction as the “Keymile Acquisition.” The aggregate cash purchase price paid for all of the shares of Keymile and certain of its subsidiaries was EUR 10,250,000 (\$11.8 million), which was paid with a combination of cash, a loan from DNI, and a draw under our Wells Fargo Bank (“Wells Fargo”) credit facility (as amended, the “Wells Fargo Facility”). Following the closing of the Keymile Acquisition, Keymile became our indirect wholly owned subsidiary.

Keymile is a leading solution provider and manufacturer of telecommunication systems for broadband access. We believe the Keymile Acquisition complements and strengthens our portfolio of broadband access solutions, which now includes a series of multi-service access platforms, including ultra-fast broadband copper access based on very-high-bit-rate DSL (“VDSL/Vectoring”) & G. Fast technology.

Broadband Access

Our broadband access products are at the core of our product strategy and offer a variety of options for carriers and service providers to connect residential and business customers. Our solutions allow carriers and service providers to either use high-speed fiber or leverage their existing deployed copper networks to offer broadband services to customer premises. Once our broadband access products are deployed, the service provider can offer voice, high-definition and ultra-high-definition video, high-speed internet access and business class services to their customers. We develop our broadband access products for all aspects of carrier and service provider access networks: customer premise equipment. Products include digital subscriber line (“DSL”) modems, Ethernet access demarcation devices, Gigabit passive optical network (“GPON”) terminals, 10 Gigabit (“10G”) passive optical network (“GPON/GEAPON/XGPON1/XGSPON/NGPON2/10GEAPON”) units and, Gigabit and 10G point-to-point Active Ethernet optical network terminals (“ONTs”). We also develop central office products, such as broadband loop carriers for DSL and voice-grade telephone service (“POTS”), high-speed digital subscriber line access multiplexers (“DSLAMs”) with G. Fast and VDSL capabilities, optical line terminals (“OLTs”) for passive optical distribution networks like GPONs, 10G passive optical networks and 10G point-to-point Active Ethernet.

Ethernet Switching

Our Ethernet switching products provide a high switching performance and manageable solution that bridges the gap from carrier access technologies to the core network. Over the past ten (10) years carriers have migrated access infrastructure to Ethernet from time-division multiplexing and asynchronous transfer mode systems. Our products can also be deployed in data centers, blurring the line between central office and data center. Our products support pure Ethernet switching as well as layer 3 IP and multiprotocol label switching (“MPLS”) and are currently being developed as part of the new programmable SDNs networks.

Mobile Backhaul

Our mobile backhaul products provide a robust, manageable and scalable solution for mobile operators that enable them to upgrade their mobile backhaul systems and migrate from 5G networks and beyond. We provide our mobile backhaul products to mobile operators or carriers who provide the transport for mobile operators. Our mobile backhaul products may be collocated at the radio access node base station and can aggregate multiple radio access node base stations into a single backhaul for delivery of mobile traffic to the radio access node network controller. We provide standard Ethernet/IP or MPLS interfaces and interoperate with other vendors in these networks. In recent years, mobile backhaul networks have been providing carriers with significant revenue growth, which has led to mobile backhaul becoming one of the most important parts of their networks.

Enterprise Passive Optical LAN

Our FiberLAN™ portfolio of POL products are designed for enterprise, campus, hospitality and entertainment arena usage. Our portfolio includes high-performance, high-bandwidth switches connected to port extenders, which include units with integrated Power over Ethernet (“PoE”) to power a wide range of PoE-enabled access devices.

Our environmentally friendly FiberLAN POL solutions are one of the most cost-effective LAN technologies that can be deployed, allowing IT network managers to deploy a future-proof, low-maintenance, manageable solution that requires less space, air conditioning, copper and electricity than other alternatives.

The FiberLAN™ 2.0 portfolio is focused on a “plug and play” architecture for a new generation of distributed enterprise IT infrastructure that is both highly secure and bandwidth scalable with unified management of wireless and wireline end points/devices from a central network operations center with full visibility and management control of remote sites. Additionally, with SDN upgrades enterprise networks can be software programmed to autonomously monitor, reconfigure, diagnose and authenticate without the need for human intervention.

Software Defined Networks

Our SDN/NFV strategy is to develop tools and building blocks that will allow customers to migrate their networks’ full complement of legacy control plane and data plane devices to a centralized intelligent controller that can reconfigure the services of hundreds of network elements in real time for more controlled and efficient provision of services and bandwidth on a web scale basis. The latest evolution of our hardware-based solution are designed to support SDN/NFV architectures.

The adoption of SDN/NFV is a slow process in the service provider space, but is viewed as providing a better service for subscribers and a more efficient and cost-effective use of hardware resources for service providers. We will leverage our broadband access, mobile backhaul and Ethernet switching expertise to extract and virtualize many of the traditional legacy control and data plane functions to allow them to be run from the Cloud.

Industry Background

We believe that expansion in our worldwide business is driven by the increased demand of subscribers and cloud service providers for mobile and fixed network access solutions and communications equipment that enable or support access to higher speed bandwidth access to the internet. Furthermore, increased competition between service providers for the subscriber business has resulted in significant investment pressure to upgrade network infrastructure to meet the growing bandwidth needs. Broadband access networks must be multiservice in nature and must have an extensive quality of service guarantees in order to support 5G mobile backhaul, symmetric business services and residential services as well as virtual overlay networks for alternative operators and wholesale access.

In recent years, the growth of social communications and networking has placed significant demands on legacy access infrastructure, which has been challenging for the industry, even for the newest and most advanced subscribers. Increased subscriber usage of smartphone, video streaming services, PC gaming services and high definition and ultra-high definition televisions has increased the demand for music, pictures, user-generated content (as found on many video-sharing sites) and high definition video, which have all become a growing part of subscribers’ regular exchange of information. Trends such as SaaS, Cloud, IoT, and 5G have also increased the demand for broadband network access. All of these new technologies share a common dependency on high-bandwidth communication networks and sophisticated traffic management tools. As bandwidth demands continue to increase, carriers need to continue to upgrade their network infrastructure to support such demand. The infrastructure upgrade cycle typically has the effect of moving bandwidth bottlenecks from one part of the network to another (such as a carrier’s access network, core network or data centers), depending on the selection of technology and costs.

It is widely acknowledged in the industry that a fiber-optic broadband access network is the preferred network architecture for a broadband fixed network. This network architecture is commonly called Fiber to the Premises (“FTTP”) for business subscribers or Fiber to the Home (“FTTH”) for residential subscribers. With FTTH all services are generally delivered at the premise through smart optical networking units (ONT). The Fiber to the Node (“FTTN”) architecture is also deployed where the fiber-optic cable terminates at a street cabinet which contains a DSLAMs or Multiple Service Access Node (“MSAN”) that then provides higher speed services to their customers over the last mile legacy copper wireline infrastructure. With the shift away from the legacy copper telephone TDM switches (used in carrier networks from the 1980’s to the early 2000’s); many carriers that continue to provide services over copper wireline networks are decommissioning their legacy telephone switches and moving services over to Voice over Internet Protocol (“VoIP”) platforms via an MSAN/Softswitch solution. Our broadband access products and solutions are designed to address all these fiber configurations commonly referred to as (FTTX) by allowing carriers and service providers to either use fiber-optic networks or leverage their existing deployed copper networks to offer broadband services to customer premises.

With respect to mobile wireless networks, the popularity of mobile smartphones and increasing demand for mobile data has forced mobile network operators to upgrade their mobile access technologies from 3rd generation wireless (“3G”) to 4th generation wireless (“4G” or “LTE”) and to plan for 5th generation wireless technologies (“5G”). These technology upgrades are typically accompanied by network infrastructure upgrades, including upgrades to the carriers’ access networks (referred to as “mobile backhaul”), core networks and data centers. Our mobile backhaul products, which have features for time sensitive networks, provide a robust, manageable and scalable solution for mobile network operators that enable them to upgrade their mobile backhaul systems and migrate to 4G and 5G.

Another growing industry trend is the desire of carriers and service providers to simplify network operation and reduce costs. Increasingly, we see network operators seeking to reduce the number of active components in their networks and to centralize network data and control in data centers, both of which require network redesigns and upgrades. Our FiberLAN portfolio of POL products, as well as our Ethernet switching products and SDN and NFV tools and building blocks, are designed to address these market trends, with POL emerging as a popular customer choice for network upgrades.

Our Strategy

We are a global provider of ultra-broadband network access solutions and communications platforms deployed by advanced Tier 1, 2 and 3 service providers and enterprise customers. We provide a wide array of reliable, cost-effective networking technologies that include broadband access, Ethernet switching, mobile backhaul, passive optical LAN and software-defined networks.

The principal elements of our strategy include:

- **Global Presence.** We have a diversified customer base that includes more than 900 customers in more than 80 countries worldwide. We provide our network access solutions to Tier 1 carriers in the Asia-Pacific region, the Middle East region and Europe, as well as Tier 2 and Tier 3 carriers in North America and Latin America. We leverage our global infrastructure, including sales offices all over the world, leading research and development centers in the United States, Germany, Korea, and Vietnam, and manufacturing capabilities in the United States, Germany, Korea, and China, to support our customer base.
- **Leading FTTx Market Position.** We enjoy a strong leadership position in the FTTx network access space. As an industry global leader in FTTx ONT and OLT portfolio options, we shipped more than 2.5 million ONTs in 2018, which we believe positions us as a top two leader, by volume, in the broadband fiber access market, excluding Chinese equipment manufacturers. We offer customers an extensive choice of indoor and outdoor fiber demarcation and fully integrated smart gateway’s with telephone data, POE, Wi-Fi 5 and OTT STB capabilities and other service interfaces. In the FTTx Optical Line Termination (OLT) category, we offer the industry’s largest portfolio of modular chassis and single platform for deployment in datacenter, central office, extended temperature environments and multi dwelling unit (MDU) scenarios.
- **Strategic Mergers and Acquisitions.** Prior to the Merger, DNS provided communications equipment primarily in the Asia-Pacific region with a particular focus on Korea, Japan and Vietnam, and Legacy Zhone provided communications equipment primarily in the Americas and in Europe, Middle East and Africa (“EMEA”) region. The Merger formed DZS, expanding our geographic reach and range of our product offerings to become a global broadband solutions provider. Further, on January 3, 2019, we acquired Keymile to expand our business efforts in the EMEA region by acquiring experienced employees in sales and marketing, support and services, manufacturing, and research and development groups. This also expanded our in-house manufacturing and logistics and procurement capacity. The Keymile Multi-service Access Nodes (MSAN) portfolio complement the DZS existing portfolio by offering leading class point-to-point active FTTx Ethernet and copper based access technology based on VDSL/Vectoring and G. Fast technology as well as VoIP gateway features. In addition, Keymile has a broad base of customers, comprised primarily of Tier 1 and Tier 2 service providers, across 31 countries, which further offers DZS customer and geographic diversification, particularly in Europe. The new DZS regional EMEA headquarters is now located in the Keymile facilities in Hannover, Germany.

- **Technology Leadership.** We believe that our future success is built upon our investment in the development of advanced communications technologies. This belief is reflected in our employee base, where more than 50% of our workforce is in research and development. We also benefit from a strong engineering lineage, and we believe we were one of the pioneers, in the early 2000's, in fiber based broadband access technology. We intend to continue to focus on research and development to maintain our leadership position in broadband network access solutions and communications equipment. These development efforts include innovating around 5G mobile backhaul technology with our leading Tier 1 carriers, developing a new generation of SDN/NFV solutions for unified wired and wireless networks, delivering a "plug and play" FiberLAN™ 2.0 solution to enhance usability and drive faster return on investment for our enterprise customers, upgrading our broadband access technology for 10 and 25/100 gigabyte access speeds, introducing our cloud managed Wi-Fi 5 solutions and data analytics offering and exploring distributed ledger and block chain technology for the telecommunications industry.
- **Ecosystem Partners.** We believe there is further opportunity to grow sales through our channel partners, particularly with distributors, value-added resellers, system integrators, as well as with municipalities and government organizations. We have a track record of building a diverse but targeted network of partners to help drive growth in specific segments of our business or in specific geographies. For FiberLAN™, we are working with distributors, value added resellers, and system integrators to broaden our enterprise go to market presence. For example, in India, we are working closely with municipalities to deploy their initial fiber-to-the-home vision and help deliver high speed broadband access to residents.

Customers

For our core business, we generally sell our products and services directly to carriers and service providers that offer voice, data and video services to businesses, governments, utilities and residential subscribers. Our global customer base includes regional, national and international carriers and service providers. To date, our products have been deployed by over 900 carriers and service providers worldwide.

For our Enterprise FiberLAN™ business, we sell solutions indirectly to end customers through system integrators and distributors to the hospitality, education, stadiums, manufacturing and business enterprises as well as to the government and military. Our global FiberLAN™ customer base includes hotels, universities, sports arenas, military bases, government institutions, manufacturing facilities and Fortune 500 businesses.

For the year ended December 31, 2018, one (1) customer, SK Broadband, Inc. represented 11% of net revenue. For the year ended December 31, 2017, no customer represented 10% or more of net revenue. For the year ended December 31, 2016, three (3) customers, SK Broadband, Inc., DNI (a related party) and LGU Plus Corp., represented 16%, 14% and 10% of net revenue, respectively.

Research and Development

The industry in which we compete is subject to rapid technological developments, evolving industry standards, changes in customer requirements, and continuing developments in communications service offerings. Our continuing ability to adapt to these changes, and to develop new and enhanced products, is a significant factor in maintaining or improving our competitive position and our prospects for growth. Therefore, we continue to make significant investments in product development.

We have core research and development teams located in the United States (Oakland, California; Seminole, Florida; Alpharetta, Georgia), Korea, Vietnam, India and Hannover, Germany through the acquisition of Keymile. In all of these centers, we develop and test both our hardware and software solutions. We continue to invest heavily in automated and scale testing capabilities for our products to better emulate our customers' networks.

Our product development activities focus on products to support both existing and emerging technologies in the segments of the communications industry that we consider represent viable revenue opportunities. We are actively engaged in continuing to refine our solution architecture, introducing new products using the various solutions we support, and in creating additional interfaces and protocols for both domestic and international markets.

We continue our commitment to invest in leading edge technology research and development for new products and innovative solutions that align with our business strategy. Our research and product development expenses were \$35.3 million, \$36.0 million, and \$25.8 million in 2018, 2017 and 2016, respectively.

Intellectual Property

We seek to establish, maintain and protect our proprietary rights in our technology and products through the use of patents, copyrights, trademarks and trade secrets. We also seek to maintain our trade secrets and confidential information by nondisclosure policies and through the use of appropriate confidentiality agreements. We have obtained a number of patents and trademarks in the United States of America (“United States”) and in other countries. There can be no assurance, however, that these rights can be successfully enforced against competitive products in every jurisdiction or any particular jurisdiction. Although we believe the protection afforded by our patents, copyrights, trademarks and trade secrets has value, the rapidly changing technology in the networking industry and uncertainties in the legal process make our future success dependent primarily on the innovative skills, technological expertise, and management abilities of our employees rather than on the protection afforded by patent, copyright, trademark, and trade secret laws.

Many of our products include intellectual property licensed from third parties. While it may be necessary in the future to seek or renew licenses relating to various aspects of our products, we believe, based upon past experience and standard industry practice, that such licenses generally could be obtained on commercially reasonable terms. Nonetheless, there can be no assurance that the necessary licenses would be available on acceptable terms, if at all. Our inability to obtain certain licenses or other rights or to obtain such licenses or rights on favorable terms, or the need to engage in litigation regarding these matters, could have a material adverse effect on our business, operating results and financial condition. The communications industry is characterized by rapidly changing technology, a large number of patents, and frequent claims and related litigation regarding patent and other intellectual property rights. We cannot assure you that our patents or other proprietary rights will not be challenged, invalidated or circumvented, that others will not assert intellectual property rights to technologies that are relevant to us, or that our rights will give us a competitive advantage. In addition, the laws of some foreign countries may not protect our proprietary rights to the same extent as the laws of the United States.

Sales and Marketing

We have a global sales presence with customers from over 80 countries, and we sell our products and services both directly and indirectly through channel partners with support from our sales force. Channel partners include distributors, value added resellers, system integrators and service providers. These partners sell directly to and service end customers and often provide additional value added services such as system installation, technical support, and professional support services in addition to equipment sales. Our sales efforts are generally organized and fitted according to geographical regions for target carriers, service providers, municipalities and enterprise customers.

- **Americas Sales.** Our Americas Sales organization includes coverage of North America and Latin America regions. On the functional side, the Americas Sales organization also manages our inside sales and sales engineer activities. The organization establishes and maintains direct and indirect relationships with customers in the Americas, which includes carriers and service providers, cable operators, utilities and enterprises. In addition, this organization is responsible for managing our distribution channel.
- **EMEA Sales.** Our EMEA Sales organization consists of the combination of the Keymile sales organization with DZS’s EMEA Sales organization. This organization establishes and maintains direct and indirect relationships with customers in the EMEA region, which includes carriers and service providers, cable operators, utilities and enterprises.
- **Asia-Pacific (excluding Korea) Sales.** Our Asia-Pacific Sales organization includes coverage of Asia Pacific countries, exclusive of Korea. The organization establishes and maintains direct and indirect relationships with customers in the Asia Pacific region, which includes carriers and service providers, cable operators, utilities and enterprises.
- **Korea Sales.** Our Korea Sales organization establishes and maintains direct relationships with our Korean customers, consisting primarily of Tier 1 carriers. These carriers have historically been early innovators across various telecommunications industry upgrade cycles, including broadband access technology and mobile backhaul technology. We partner with such carriers from the early phases of technology development to ensure our products are carrier-grade and purpose-built for the most rigorous of environments.
- **Enterprise Sales.** Our Enterprise Sales organization includes global geographic coverage, and is primarily focused on coverage of our FiberLAN solutions. The organization establishes and maintains direct and indirect relationships with enterprise customers for both greenfield and brownfield projects targeting enterprise customers in several industry verticals, including education (i.e., K-12, universities and colleges, etc.), hospitality, healthcare, stadiums, corporate campuses, and others.

Our marketing team works closely with our sales, research and product development organizations, and our customers by providing communications that keep the market current on our products and features. Marketing also identifies and sizes new target markets for our products, creates awareness of our company and products, generates contacts and leads within these targeted markets, performs outbound education and public relations, and participates in industry associations and standard industry bodies to promote the growth of the overall industry.

Our backlog consists of purchase orders for products and services that we expect to ship or perform within the next year. Our backlog may fluctuate based on the timing of when purchase orders are received. As of December 31, 2018, our backlog was \$47.3 million, compared to \$24.4 million at December 31, 2017. We consider backlog to be an indicator, but not the sole predictor, of future sales because our customers may cancel or defer orders without penalty.

Competition

We compete in communications equipment markets, providing products and services for the delivery of voice, data and video services. These markets are characterized by rapid change, converging technologies and a migration to solutions that offer superior advantages. These market factors represent both an opportunity and a competitive threat to us. We compete with numerous vendors in our core business, including ADTRAN, Calix, Huawei, Nokia, and ZTE, among others. In our FiberLAN business, our competitors include Cisco, Nokia, and Tellabs, among others. In our Ethernet switching business, our competitors include Arris, Cisco and Juniper Networks, among others. In addition, a number of companies have introduced products that address the same network needs that our products and solutions address, both domestically and internationally. The overall number of our competitors may increase, and the identity and composition of competitors may change. As we continue to expand our sales globally, we may see new competition in different geographic regions. Barriers to entry are relatively low, and new ventures to create products that do or could compete with our products are regularly formed. Many of our competitors have greater financial, technical, sales and marketing resources than we do.

The principal competitive factors in the markets in which we presently compete and may compete in the future include:

- product performance;
- feature capabilities;
- manufacturing capacity;
- interoperability with existing products;
- scalability and upgradeability;
- conformance to standards;
- breadth of services;
- reliability;
- ease of installation and use;
- geographic footprints for products;
- ability to provide customer financing;
- pricing;
- technical support and customer service; and
- brand recognition.

While we believe that we compete successfully with respect to each of these factors, we expect to face intense competition in our markets. In addition, the inherent nature of communications networking requires interoperability. As such, we must cooperate and at the same time compete with many companies.

Manufacturing and Operations

Operationally, we use a global sourcing procurement program to purchase and manage key raw materials and subassemblies through qualified suppliers, sub-contractors, original equipment and design manufacturers and electronic manufacturing service vendors. The manufacturing process uses a strategic combination of procurement from qualified suppliers and in-house manufacturing, throughout the process we manage the assembly, quality assurance, customer testing, final inspection and shipping of our products

We manufacture our low volume, high mix products at our manufacturing facility in the Florida, USA and Hannover, Germany, through the acquisition of Keymile. For certain products, we rely on subcontractors and original design manufacturers for high volume, low mix products.

Some completed products are procured to our specifications and shipped directly to our customers. We also acquire completed products from certain suppliers, which we configure and ship from our facility. Some of these purchases are significant. We purchase both standard off-the-shelf parts and components, which are generally available from more than one supplier, and single-source parts and components. We have generally been able to obtain adequate supplies to meet customer demand in a timely manner from our current vendors, or, when necessary, from alternate vendors. We believe that alternate vendors can be identified if current vendors are unable to fulfill our needs, or design changes can be made to employ alternate parts.

We design, specify, and monitor all of the tests that are required to meet our quality standards. Our manufacturing and test engineers work closely with our design engineers to ensure manufacturability and testability of our products, and to ensure that manufacturing and testing processes evolve along with our technologies. Our manufacturing engineers specify, build, or procure our test stations, establish quality standards and protocols, and develop comprehensive test procedures and processes to assure the reliability and quality of our products. Products that are procured complete or partially complete are inspected, tested, or audited for quality control.

Our Quality Management System is compliant with, and we are certified to, ISO-9001:2015 by our external registrar, National Standards Authority of Ireland. ISO-9001:2015 requires that our processes be documented, followed and continuously improved. Internal audits are conducted on a regular schedule by our quality assurance personnel, and external audits are conducted by our external registrar each year. Our quality system is based upon our model for quality assurance in production and service to ensure our products meet rigorous quality standards.

We believe that we have sufficient production capacity to meet current and future demand for our product offerings through a combination of existing and added capacity, additional employees and the outsourcing of products or components.

Compliance with Regulatory and Industry Standards

Our products must comply with a significant number of voice and data regulations and standards which vary by jurisdiction. Standards for new services continue to evolve, and we may need to modify our products or develop new versions to meet these standards. Standards setting and compliance verification in the United States are determined by the Federal Communications Commission, Underwriters Laboratories, Quality Management Institute, Telcordia Technologies, Inc., and other communications companies. In international markets, our products must comply with standards issued, implemented and enforced by the regulatory authorities of foreign jurisdictions, as applicable, such as the European Telecommunications Standards Institute (“ETSI”), among others.

Environmental Matters

Our operations and manufacturing processes are subject to federal, state, local and foreign environmental protection laws and regulations. Such laws and regulations relate to the presence, use, handling, storage, discharge and disposal of certain hazardous materials and wastes, the pre-treatment and discharge of process waste waters and the control of process air pollutants. Under certain laws of the United States, we can be held responsible for cleanup costs at currently or formerly owned or operated locations or at third party sites to which our wastes were sent for disposal. To date, liabilities relating to contamination have not been significant, and have not had a material impact on our operations or results. We believe that our operations and manufacturing processes currently comply in all material respects with applicable environmental protection laws and regulations. If we fail to comply with any present or future laws or regulations, we could be subject to liabilities, the suspension of production or a prohibition on the sale of our products. In addition, such regulations could require us to incur significant expenses to comply with environmental laws or regulations, including expenses associated with the redesign of any non-compliant product or the development or installation of additional pollution control technology. From time to time new laws or regulations are enacted, and it is difficult to anticipate how such laws or regulations will be implemented and enforced, or the impact they will have on our operations or results. For example, in 2003 the European Union enacted the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive and the Waste Electrical and Electronic Equipment Directive, for implementation in European Union member states. Similar legislation could be currently in force or that are being considered in the United States or other countries, such as Japan and China. We are aware of and are taking suitable action to comply with the new European Union Restriction of Hazardous Substances standards. Our failure to comply with any regulatory requirements or contractual obligations relating to environmental matters or hazardous materials could result in us being liable for costs, fines, penalties and third-party claims, and could jeopardize our ability to conduct business in the jurisdictions where such laws or the regulations apply.

Audit Committee Investigation

On March 21, 2017, our Audit Committee concluded, in consultation with management and after informing our former independent registered public accounting firm, that Legacy Zhone's unaudited condensed consolidated financial statements contained in its Amendment No. 2 to Quarterly Report on Form 10-Q/A for the quarter ended June 30, 2016 should no longer be relied upon due to material errors associated with the sale and subsequent return of certain products sold in December 2014.

In connection with such findings, our Audit Committee commenced an independent investigation to determine whether any Legacy Zhone financial statements prior to the quarter ended June 30, 2016 contained material errors. In July 2017, our Audit Committee concluded, in consultation with management and after informing our former independent registered public accounting firm, that Legacy Zhone's unaudited condensed consolidated financial statements contained in its Quarterly Reports on Form 10-Q for the quarters ended March 31, 2015, June 30, 2015, September 30, 2015 and March 31, 2016, and Legacy Zhone's audited consolidated financial statements and assessments of internal control over financial reporting for the years ended December 31, 2015 and 2014 contained in its Annual Reports on Form 10-K should no longer be relied upon.

The errors in Legacy Zhone's financial statements for pre-Merger periods do not impact DZS's financial statements after the closing of the Merger because DNS is treated as an accounting acquirer of DZS.

Matters relating to or arising from our Audit Committee investigation, and the associated material weaknesses identified in our internal control over financial reporting, including adverse publicity, (a) have caused us to incur significant legal, accounting and other professional fees and other costs, (b) have exposed us to greater risks associated with civil litigation, regulatory proceedings and government enforcement actions, (c) have diverted resources and attention that would otherwise be directed toward our operations and implementation of our business strategy and (d) may have impacted our ability to attract and retain customers, employees and vendors.

Employees

As of December 31, 2018, we employed over 670 staff members worldwide. We consider the relationships with our employees to be positive. Competition for technical personnel in our industry is intense. We believe that our future success depends in part on our continued ability to hire, assimilate and retain qualified personnel. To date, we believe that we have been successful in recruiting qualified employees, but there is no assurance that we will continue to be successful in the future.

Website and Available Information

Our investor website address is <http://investor-dzsi.com>. The information on our website does not constitute part of this Annual Report on Form 10-K, or any other report, schedule or document we file or furnish to the SEC. On the "Investor Relations" section of our website at <http://investor-dzsi.com>, we make available the following filings available free of charge as soon as reasonably practicable after they are electronically filed with or furnished to the SEC: our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and any amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act.

ITEM 1A. RISK FACTORS

Set forth below and elsewhere in this Annual Report on Form 10-K and in other documents we file with the SEC are risks and uncertainties that could cause actual results to differ materially from the results contemplated by the forward-looking statements contained in this Annual Report on Form 10-K.

Our level of indebtedness could adversely affect our business, operations, financial condition, and liquidity

We have a significant amount of indebtedness. As of December 31, 2018, the aggregate principal amount of our outstanding indebtedness was \$45.9 million, consisting of \$31.8 million in principal amount of outstanding borrowings under our short-term debt obligations and \$14.1 million in long-term related party borrowings. We may incur additional indebtedness in the future, including additional borrowings under our credit facilities with PNC Bank, National Association, and Citibank, N.A. as lenders, and PNC Bank as agent for the lenders, which we entered into on February 27, 2019 (the "PNC Facility") or other future credit facilities with other financial institutions.

Even if we are able to obtain new financing upon a default under the secured loan agreement, it may not be on commercially reasonable terms or on terms that are acceptable to us. The level of indebtedness could have important consequences and could materially and adversely affect us in a number of ways, including:

- limiting our ability to obtain additional financing in the future for working capital, capital expenditures, acquisitions or general corporate purposes;
- limiting our flexibility to plan for, or react to, changes in our business or market conditions;

- requiring us to use a significant portion of any future cash flow from operations to repay or service the debt, thereby reducing the amount of cash available for other purposes;
- making us more highly leveraged than some of our competitors, which could place us at a competitive disadvantage; and
- making us more vulnerable to the impact of adverse economic and industry conditions and increases in interest rates.

The PNC Facility and the instruments governing our other indebtedness contain certain covenants, limitations, and conditions with respect to the Company that could restrict our ability to operate our business. The covenants include a maximum leverage ratio, a minimum fixed charge coverage ratio, and a minimum liquidity covenant, as well as financial reporting obligations, and usual and customary events of default. If an event of default occurs under the PNC Facility, the agent and the lenders will be entitled to take various actions, including requiring the immediate repayment of all outstanding amounts, terminating commitments to make additional advances and selling our assets to satisfy the obligations under the outstanding indebtedness.

In the past, we have violated the covenants in our credit facilities and received waivers for these violations. As of December 31, 2017, we were in technical violation of covenants under the Wells Fargo Facility to pledge the stock of certain foreign subsidiaries and transfer certain funds to Wells Fargo bank accounts. On March 19, 2018, we executed an agreement with Wells Fargo, which cured the breach.

We cannot assure you that we will be able to comply with our financial or other covenants in the future, or that any covenant violations will be waived in the future. Any acceleration of amounts due could have a material adverse effect on our business, operations, financial condition, and liquidity.

We cannot assure you that we will be able to generate cash flow in amounts sufficient to enable us to service our debt or to meet our working capital and capital expenditure requirements. If we are unable to generate sufficient cash flow from operations or to borrow sufficient funds to service our debt, due to borrowing base restrictions or otherwise, we may be required to sell assets, reduce capital expenditures, purchase credit insurance or obtain additional financing. We cannot assure you that we will be able to engage in any of these actions on reasonable terms, if at all.

Our ability to obtain additional capital could require us to reduce our operations and product development and result in harm to our financial condition, our operations, our prospects and our ability to grow and compete effectively

We need sufficient capital to fund our ongoing operations. Our ability to meet our obligations will depend on our ability to access funds. We cannot be certain that additional funds will be available to us on favorable terms when required, or at all. If we cannot raise additional funds when we need them, our business, operations, financial condition, and liquidity could be materially and adversely affected.

As of December 31, 2018, we had approximately \$27.7 million in cash and cash equivalents and \$45.9 million in aggregate principal amount of outstanding indebtedness, as described in the preceding Risk Factor. Our cash and cash equivalents as of December 31, 2018 included \$7.1 million in cash balances held by our international subsidiaries. Our current lack of liquidity could harm us by:

- increasing our vulnerability to adverse economic conditions in our industry or the economy in general;
- requiring substantial amounts of cash to be used for debt servicing, rather than other purposes, including operations and new product innovation;
- limiting our ability to plan for, or react to, changes in our business and industry; and
- influencing investor and customer perceptions about our financial stability and limiting our ability to obtain financing or acquire customers.

Our current lack of liquidity could be further harmed, and we may incur significant losses or expend significant amounts of capital if:

- the market for our products develops more slowly than anticipated;
- we fail to establish market share or generate revenue at anticipated levels;
- our capital expenditure forecasts change or prove inaccurate; or
- we fail to respond to unforeseen challenges or take advantage of unanticipated opportunities.

To meet our liquidity needs and to finance our capital expenditures and working capital needs for our business, we may be required to raise substantial additional capital or reduce our operations. Raising additional capital could require selling assets, issuing debt or equity securities, purchasing credit insurance, borrowing additional capital or other methods. Additional capital, if required, may not be available on acceptable terms, or at all.

If we elect to raise additional capital through the issuance of debt securities or other debt financing, if we are able to incur additional debt at all, the terms of such debt may include unfavorable covenants, restrictions and financial ratios that may restrict our ability to operate our business.

If we elect to raise additional capital through the issuance of equity securities, such issuance may be dilutive to existing stockholders and could reduce the trading price of our common stock. Volatility in our stock price may make it difficult and costly for us to raise capital through the issuance of common stock, preferred stock or other equity securities. Moreover, in connection with any registration statement for the sale of shares of our common stock or other securities, we may be required to include audited annual and unaudited interim historical financial statements of Legacy Zhone and/or Keymile, which may make raising additional capital through a public offering of securities more costly and time consuming.

Our ability to grow our business requires a significant commitment of capital, and we currently lack liquid funds. If we are unable to meet our liquidity needs through obtaining additional capital on acceptable terms or reducing costs, we may become unable to maintain our existing operations, pay ordinary expenses, fund our business expansion or product innovation, pursue future business opportunities, respond to unanticipated capital requirements, or respond to competitive pressures, any of which could have a material adverse effect on our business, operations, financial condition, and liquidity. In addition, we may be required to reduce the scope of our planned product development and sales and marketing efforts beyond the reductions that we have previously taken, and reduce operations in low margin regions, including reductions in headcount, which could have a material adverse effect on our business, operations, financial condition and liquidity.

DNI, the majority owner of our outstanding common stock, controls our ability to obtain financing and other matters requiring stockholder approval, and DNI's interests may conflict with our interests and the interests of other stockholders

As of December 31, 2018, DNI owned approximately 57.2% of the outstanding shares of our common stock. Accordingly, as long as DNI and its affiliates hold shares representing a majority of the votes entitled to be cast by the holders of our outstanding common stock at a stockholder meeting, (a) DNI generally will have the ability to control the outcome of any matter submitted for the vote of our stockholders, except in certain circumstances set forth in our certificate of incorporation or bylaws, and (b) DNI will be able to freely nominate and elect all the members of our board of directors, subject only to a requirement that a certain number of directors qualify as "independent directors" under Nasdaq listing rules and applicable laws.

We have elected to be treated as a "controlled company" under Nasdaq Marketplace Rules because more than fifty percent (50%) of the voting power for the election of directors is held by DNI. As a "controlled company," we may rely on exemptions from certain corporate governance requirements under Nasdaq Marketplace Rules, including the requirement that we have a majority of independent directors on the Board of Directors and requirements with respect to compensation and nominating and corporate governance committees.

The directors elected by DNI have the authority to make decisions affecting our capital structure, including the issuance of additional capital stock or options, the incurrence of additional indebtedness, the implementation of stock repurchase programs, and the declaration of dividends. The interests of DNI may conflict with the interests of our other stockholders or with holders of our indebtedness. As a result of DNI's controlling vote over matters submitted to our stockholders for approval (subject to any applicable limitations in our certificate of incorporation and bylaws), we may take actions that our stockholders or holders of our indebtedness do not view as beneficial. In addition, the existence of a controlling stockholder may make it more difficult for a third party to acquire us or discourage a third party from seeking to acquire us. A potential third party acquirer would be required to negotiate any such transaction with DNI, and the interests of DNI with respect to such transaction may be different from the interests of our other stockholders or with holders of our indebtedness. In addition, provisions of our certificate of incorporation, bylaws and applicable laws, including Delaware law, could make it more difficult for a third party to acquire us, even if doing so would be beneficial to certain stockholders.

We have experienced significant losses and we may incur losses in the future. If we fail to generate sufficient revenue to sustain our profitability, our stock price could decline

We had net income of \$2.8 million and \$1.2 million for the years ended December 31, 2018 and 2017. However, we incurred significant losses in prior years. We have an accumulated deficit of \$15.8 million as of December 31, 2018. We have significant fixed expenses and expect that we will continue to incur substantial manufacturing, research and product development, sales and marketing, customer support, administrative and other expenses in connection with the ongoing development of our business. In addition, we may be required to spend more on research and product development than originally budgeted to

respond to industry trends. We may also incur significant new costs related to acquisitions and the integration of new technologies and other acquisitions that may occur in the future. We may not be able to adequately manage costs and expenses or achieve or maintain adequate operating margins. As a result, our ability to sustain profitability in future periods will depend on our ability to generate and sustain higher revenue while maintaining reasonable costs and expense levels. If we fail to generate sufficient revenue to sustain profitability in future periods, we may incur operating losses, which could be substantial, and our stock price could decline.

In connection with the Keymile Acquisition, we assumed certain of Keymile's liabilities, which could harm our business, operations, financial condition, and liquidity

Pursuant to the definitive agreement for the Keymile Acquisition, we assumed certain of Keymile's liabilities, including tax and pension liabilities, and any liabilities that may arise related to representations and warranties of Keymile in connection with a prior sale of assets with representations and warranties that survive through 2022. Although the definitive agreement for the Keymile Acquisition entitles us to indemnification for losses incurred related to any such claims or liabilities, our right to indemnification may be limited to the purchase price of Keymile, or EUR 10,250,000 and our and third party provided warranty and indemnity liability insurance coverage of up to EUR 35,285,000. If such claims or losses exceed such amount, or if they are not indemnifiable under the Keymile Acquisition definitive agreement, any such losses could negatively impact our financial situation. In addition, our closing of the Keymile Acquisition could give rise to substantial tax liabilities under German law, which could negatively impact our financial condition and liquidity.

We may not realize the anticipated benefits of the Keymile Acquisition if the integration of Keymile is not implemented successfully or cost-effectively

Our ability to realize the anticipated benefits of the Keymile Acquisition will depend, to a large extent, on our ability to successfully integrate Keymile with our businesses. Integrating and coordinating certain aspects of the operations and personnel of Keymile involves complex operational, technological and personnel-related challenges. Such integration may require a significant amount of management's time and attention. The potential difficulties, and resulting costs and delays, relating to the integration of Keymile include, among others:

- the diversion of management's attention from day-to-day operations;
- the management of an additional subsidiary and business unit;
- the assimilation of Keymile employees and the integration of the two business cultures;
- challenges in attracting and retaining key personnel;
- the need to integrate information, accounting, finance, sales, billing, payroll and regulatory compliance systems;
- challenges in keeping existing customers and obtaining new customers; and
- challenges in combining product offerings and sales and marketing activities.

If we are unable to implement and maintain an effective system of internal controls, the existence of one or more internal control deficiencies could result in errors in our financial statements, and substantial costs and resources may be required to rectify internal control deficiencies. If we cannot produce reliable financial reports, investors could lose confidence in our reported financial information, the market price of our stock could decline significantly, we may be unable to obtain additional financing to operate and expand our business, and our business, operations, financial condition, and liquidity could be materially harmed. In addition, the integration process may cause an interruption of, or loss of momentum in, the activities of our business. If our management is not able to effectively manage the integration process, or if any significant business activities are interrupted as a result of the integration process, our business could suffer and its results of operations, financial condition, and liquidity may be harmed.

Even if Keymile is successfully integrated into our businesses, we may not realize the full benefits of the Keymile Acquisition, including anticipated cost synergies, growth opportunities and other financial and operating benefits, within the expected timeframe or at all. In addition, we expect to incur significant integration and restructuring expenses to realize these synergies. However, many of the expenses that will be incurred are, by their nature, difficult to estimate accurately. These expenses could, particularly in the near term, exceed the savings that we expect to achieve from elimination of duplicative expenses and the realization of economies of scale and cost savings. Although we expect that the realization of efficiencies related to the integration of the businesses may offset incremental transaction, Keymile Acquisition-related and restructuring costs over time, we cannot give any assurance that this net benefit will be achieved in the near term, or at all. Any of these matters could adversely affect our business, operations, financial condition, and liquidity.

Any strategic acquisitions or investments we make could disrupt our operations and harm our business, operations, financial condition, and liquidity

Integrating acquired organizations and their products and services, including the integration of completed acquisitions, may be expensive, time-consuming and a strain on our resources and our relationships with employees, customers, distributors and

suppliers, and ultimately may not be successful. The benefits or synergies we may expect from the acquisition of complementary or supplementary businesses may not be realized to the extent or in the time frame we initially anticipated. Mergers and acquisitions of high-technology companies are inherently risky and subject to many factors outside of our control, and we cannot be certain that our previous or future acquisitions will be successful and will not materially adversely affect our business, operations, financial condition, and liquidity. Any failure to successfully acquire and integrate acquired organizations and their products and services could seriously harm our business, operations, financial condition, and liquidity.

Some of the risks that could affect our ability to successfully integrate acquired businesses, including Keymile's telecommunication systems business, include those associated with:

- failure to successfully further develop the acquired products or technology;
- insufficient revenues to offset increased expenses associated with acquisitions and where competitors in such markets have stronger market positions;
- conforming the acquired company's standards, policies, processes, procedures and controls with our operations;
- difficulties in entering markets in which we have no or limited prior experience;
- difficulties in integrating the operations, technologies, products and personnel of the acquired companies;
- coordinating new product and process development, especially with respect to highly complex technologies;
- potential loss of key employees, customers, distributors, vendors and other business partners of the companies we acquire following and continuing after the announcement of acquisition plans or transactions;
- hiring additional management and other critical personnel;
- in the case of foreign acquisitions, the need to integrate operations across different cultures and languages and to address the particular economic, currency, political and regulatory risks associated with specific countries;
- increasing the scope, geographic diversity and complexity of our operations;
- diversion of management's time and attention away from normal daily operations of the business and the challenges of managing larger and more widespread operations resulting from acquisitions;
- consolidation of facilities, integration of the acquired company's accounting, human resource and other administrative functions and coordination of product, engineering and sales and marketing functions;
- the geographic distance between the companies;
- failure to comply with covenants related to the acquired business;
- unknown, underestimated, and/or undisclosed liabilities for activities of the acquired company before the acquisition, including patent and trademark infringement claims, violations of laws, employment claims, pension liabilities, commercial disputes, tax liabilities and other known and unknown liabilities; and
- litigation or other claims in connection with the acquired company, including claims for terminated employees, customers, former stockholders or other third parties.

In addition, if we do complete future acquisitions, we could:

- issue stock that could dilute our current stockholders' percentage ownership;
- consume a substantial portion of our cash resources;

- incur substantial debt;
- assume liabilities;
- increase our ongoing operating expenses and level of fixed costs;
- record goodwill and non-amortizable intangible assets that will be subject to impairment testing and potential periodic impairment charges;
- incur amortization expenses related to certain intangible assets;
- incur large and immediate write-offs; and
- become subject to litigation.

We have identified material weaknesses in our internal control over financial reporting, and we cannot provide assurances that these weaknesses will be effectively remediated or that additional material weaknesses will not occur in the future. If our internal control over financial reporting or our disclosure controls and procedures are not effective, we may not be able to accurately report our financial results, prevent fraud or file our periodic reports in a timely manner, which may cause investors to lose confidence in our reported financial information and which may lead to a decline in our stock price

We are 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 generally accepted accounting principles. We assessed the effectiveness of our internal control over financial reporting as of December 31, 2018, the end of our fiscal year. In making this assessment, management used the criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee Sponsoring Organizations of the Treadway Commission. Based on our assessment, we have concluded that, as of December 31, 2018, our internal control over financial reporting was not effective because of the unremediated material weaknesses in our internal control over financial reporting described below.

On February 20, 2017, our Audit Committee concluded, in consultation with management, and after informing our independent registered public accounting firm, that, due to incorrect application of generally accepted accounting principles that resulted in material misstatements and a restatement of our unaudited condensed consolidated financial statements, our previously issued interim unaudited condensed consolidated financial statements for the three and nine months ended September 30, 2016 should no longer be relied upon.

On March 21, 2017, our Audit Committee concluded, in consultation with management and after informing our former independent registered public accounting firm, that Legacy Zhone's unaudited condensed consolidated financial statements for the quarter ended June 30, 2016 should also no longer be relied upon due to material errors associated with the sale and subsequent return of certain products sold in December 2014.

In connection with such findings, our Audit Committee commenced an independent investigation to determine whether any Legacy Zhone financial statements prior to the quarter ended June 30, 2016 contained material errors. In July 2017, our Audit Committee concluded, in consultation with management and after informing our former independent registered public accounting firm, that Legacy Zhone's unaudited condensed consolidated financial statements contained in its Quarterly Reports on Form 10-Q for the quarters ended March 31, 2015, June 30, 2015, September 30, 2015 and March 31, 2016, and Legacy Zhone's audited consolidated financial statements and assessments of internal control over financial reporting for the years ended December 31, 2015 and 2014 contained in its Annual Reports on Form 10-K should no longer be relied upon. See "Business - Audit Committee Investigation" above for additional information. Furthermore, as discussed in "Part II, Item 9A. Controls and Procedures," our management has identified material weaknesses in our internal control over financial reporting, which were unremediated as of December 31, 2018. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of the registrant's annual or interim financial statements will not be prevented or detected on a timely basis.

Based on our investigations and our discovery that incorrect applications of generally accepted accounting principles had resulted in material misstatements and a restatement of our unaudited condensed consolidated financial statements for the three and nine months ended September 30, 2016, we identified material weaknesses in our internal control over financial reporting as of December 31, 2016, which continue to exist at December 31, 2018. One such weakness was that we lacked personnel with the appropriate accounting knowledge, experience and competence to control our financial close process, which resulted in an incorrect application of generally accepted accounting principles. In addition, we did not design and maintain effective controls to determine the completeness and accuracy of the accounting for complex transactions, specifically related to the Merger that occurred on September 9, 2016, which resulted in an incorrect application of generally accepted accounting principles and a restatement of our unaudited condensed consolidated financial statements for the three and nine months period ended September 30, 2016 to correct material misstatements. These material weaknesses could result in a material misstatement in the annual or interim consolidated financial statements that would not be prevented or detected.

Our future operating results are difficult to predict and our stock price may continue to be volatile

As a result of a variety of factors discussed in this Annual Report on Form 10-K, our revenues for a particular quarter are difficult to predict. Our revenue and operating results may vary significantly from quarter to quarter due to a number of factors, many of which are outside of our control. The primary factors that could affect our results of operations include the following:

- commercial acceptance of our products and services;
- fluctuations in demand for network access products;
- fluctuation in gross margin;
- our ability to attract and retain qualified and key personnel;
- the timing and size of orders from customers;
- the ability of our customers to finance their purchase of our products as well as their own operations;
- new product introductions, enhancements or announcements by our competitors;
- our ability to develop, introduce and ship new products and product enhancements that meet customer requirements in a timely manner;
- changes in our pricing policies or the pricing policies of our competitors;
- the ability of our company and our contract manufacturers to attain and maintain production volumes and quality levels for our products;
- our ability to obtain sufficient supplies of sole or limited source components;
- increases in the prices of the components we purchase, or quality problems associated with these components;
- unanticipated changes in regulatory requirements which may require us to redesign portions of our products;
- changes in accounting rules;
- integrating and operating any acquired businesses;
- our ability to achieve targeted cost reductions;
- how well we execute on our strategy and operating plans; and
- general economic conditions as well as those specific to the communications, internet and related industries.

Any of the foregoing factors, or any other factors discussed elsewhere herein, could have a material adverse effect on our business, operations, financial condition and liquidity that could adversely affect our stock price. We anticipate that our stock price and trading volume may continue to be volatile in the future, whether due to the factors described above, volatility in public stock markets generally (particularly in the technology sector) or otherwise.

Between December 2016 and February 2017, the bid price for our common stock traded below the \$1.00 minimum per share bid price required for continued inclusion on the Nasdaq Capital Market under Marketplace Rule 5550(a)(2). We have received letters from Nasdaq requiring us to regain compliance within a specified period. A failure to regain compliance could result in our stock being delisted, subject to a right of appeal. On February 28, 2017, we effected a one-for-five reverse stock split of our outstanding shares of common stock. As a result of this, in March 2017, we received written notification from Nasdaq advising us that we had regained compliance with the minimum bid price rule as the closing bid price of our common stock had been \$1.00 per share or greater for ten consecutive business days. There can be no assurance that our stock price will remain above the minimum bid price or that we will be able to regain compliance if our stock price falls below the minimum bid price again in the future. In addition, if our average market capitalization falls below the carrying value of our assets for an extended period of time as it has done during recent years, this may indicate that the fair value of our net assets is below their carrying value, and may result in recording impairment charges.

The long and variable sales cycles for our products could cause revenue and operating results to vary significantly from quarter to quarter

The target customers for our products have substantial and complex networks that they traditionally expand in large increments on a periodic basis. Accordingly, our marketing efforts are focused primarily on prospective customers that may purchase our products as part of a large-scale network deployment. Our target customers typically require a lengthy evaluation, testing and product qualification process. Throughout this process, we are often required to spend considerable time and incur significant expenses educating and providing information to prospective customers about the uses and features of our products. Even after a company makes the final decision to purchase our products, it could deploy our products over extended periods of time. The timing of deployment of our products varies widely, and depends on a number of factors, including our customers' skill sets, geographic density of potential subscribers, the degree of configuration and integration required to deploy our products, and our customers' ability to finance their purchase of our products as well as their operations. As a result of any of these factors, our revenue and operating results could vary significantly from quarter to quarter.

The market we serve is highly competitive and we could not be able to compete successfully

Competition in communications equipment markets is intense. These markets are characterized by rapid change, converging technologies and a migration to networking solutions that offer superior advantages. We are aware of many companies in related markets that address particular aspects of the features and functions that our products provide. Currently, our primary competitors in our core business include ADTRAN, Calix, Huawei, Nokia and ZTE, among others. In our FiberLAN business, our competitors include Cisco, Nokia and Tellabs. In our Ethernet switching business, our competitors include Arris, Cisco, and Juniper. We also may face competition from other communications equipment companies or other companies that may enter our markets in the future. In addition, a number of companies have introduced products that address the same network needs that our products and solutions address, both domestically and internationally. Many of our competitors have longer operating histories, greater name recognition, larger customer bases and greater financial, technical, sales and marketing resources than we do and may be able to undertake more extensive marketing efforts, adopt more aggressive pricing policies and provide more customer financing than we can. In particular, we are encountering price-focused competitors from Asia, especially China, which places pressure on us to reduce our prices. If we are forced to reduce prices in order to secure customers, we may be unable to sustain gross margins at desired levels or achieve profitability. Competitive pressures could result in increased pricing pressure, reduced profit margins, 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. Moreover, our competitors may foresee the course of market developments more accurately than we do and could develop new technologies that render our products less valuable or obsolete.

In our markets, principal competitive factors include:

- product performance;
- interoperability with existing products;
- scalability and upgradeability;
- conformance to standards;
- breadth of services;
- reliability;
- ease of installation and use;
- geographic footprints for products;
- ability to provide customer financing;
- pricing;
- technical support and customer service; and
- brand recognition.

If we are unable to compete successfully against our current and future competitors, we may have difficulty obtaining or retaining customers, and we could experience price reductions, order cancellations, increased expenses and reduced gross margins, any of which could have a material adverse effect on our business, operations, financial condition, and liquidity.

If demand for our products and solutions does not develop as we anticipate, then our business operations, financial condition, and liquidity will be adversely affected

Our future revenue depends significantly on our ability to successfully develop, enhance and market our products and solutions to our target markets. Most network service providers have made substantial investments in their current infrastructure, and they may elect to remain with their current architectures or to adopt new architectures in limited stages or over extended periods of time. A decision by a customer to purchase our products will involve a significant capital investment. We must convince our service provider customers that they will achieve substantial benefits by deploying our products for future upgrades or expansions. We may experience difficulties with product reliability, partnering, and sales and marketing efforts that could adversely affect our business and divert management attention and resources from our core business. We do not know whether a viable market for our products and solutions will develop or be sustainable in our businesses. If these markets do not develop or develop more slowly than we expect, our business, operations, financial condition and liquidity will be materially harmed.

We depend upon the development of new products and enhancements to existing products, and if we fail to predict and respond to emerging technological trends and customers' changing needs, our operating results and market share may suffer

The markets for our products are characterized by rapidly changing technology, evolving industry standards, changes in end-user requirements, frequent new product introductions and changes in communications offerings from network service provider customers. Our future success depends on our ability to anticipate or adapt to such changes and to offer, on a timely and cost-effective basis, products that meet changing customer demands and industry standards. We may not have sufficient resources to successfully and accurately anticipate customers' changing needs and technological trends, manage long development cycles or develop, introduce and market new products and enhancements. The process of developing new technology is complex and uncertain, and if we fail to develop new products or enhancements to existing products on a timely and cost-effective basis, or if our new products or enhancements fail to achieve market acceptance, our business, operations, financial condition and liquidity would be materially adversely affected.

Because our products are complex and are deployed in complex environments, our products may have defects that we discover only after full deployment by our customers, which could seriously harm our business

We produce highly complex products that incorporate leading-edge technology, including both hardware and software. Software typically contains defects or programming flaws that can unexpectedly interfere with expected operations. In addition, our products are complex and are designed to be deployed in large quantities across complex networks. Because of the nature of these products, they can only be fully tested when completely deployed in large networks with high amounts of traffic, and there is no assurance that our pre-shipment testing programs will be adequate to detect all defects. As a result, our customers may discover errors or defects in our hardware or software, or our products may not operate as expected. If we are unable to cure a product defect, we could experience damage to our reputation, reduced customer satisfaction, loss of existing customers and failure to attract new customers, failure to achieve market acceptance, reduced sales opportunities, loss of revenue and market share, increased service and warranty costs, diversion of development resources, legal actions by our customers, and increased insurance costs. Defects, integration issues or other performance problems in our products could also result in financial or other damages to our customers. Our customers could seek damages for related losses from us, which could seriously harm our business, operations, financial condition and liquidity. A product liability claim brought against us, even if unsuccessful, would likely be time consuming and costly. The occurrence of any of these problems would seriously harm our business, operations, financial condition and liquidity.

We rely on contract manufacturers for a portion of our manufacturing requirements

We rely on contract manufacturers to perform a portion of the manufacturing operations for our products. These contract manufacturers build products for other companies, including our competitors. In addition, we do not have contracts in place with some of these providers and may not be able to effectively manage those relationships. We cannot be certain that our contract manufacturers will be able to fill our orders in a timely manner. We face a number of risks associated with this dependence on contract manufacturers including reduced control over delivery schedules, the potential lack of adequate capacity during periods of excess demand, poor manufacturing yields and high costs, quality assurance, increases in prices, and the potential misappropriation of our intellectual property. We have experienced in the past, and may experience in the future, problems with our contract manufacturers, such as inferior quality, insufficient quantities and late delivery of products.

A shortage of adequate component supply or manufacturing capacity could increase our costs or cause a delay in our ability to fulfill orders, and our failure to estimate customer demand properly could result in excess or obsolete component inventories that could adversely affect our gross margins

Occasionally, we may experience a supply shortage, or a delay in receiving, certain component parts as a result of strong demand for the component parts and/or capacity constraints or other problems experienced by suppliers. If shortages or delays persist, the price of these components may increase, or the components may not be available at all, and we may also encounter shortages if we do not accurately anticipate our needs. Conversely, we may not be able to secure enough components at

reasonable prices or of acceptable quality to build new products in a timely manner in the quantities or configurations needed. Accordingly, our revenue and gross margins could suffer until other sources can be developed. Our operating results would also be adversely affected if, anticipating greater demand than actually develops, we commit to the purchase of more components than we need. Furthermore, as a result of binding price or purchase commitments with suppliers, we may be obligated to purchase components at prices that are higher than those available in the current market. In the event that we become committed to purchase components at prices in excess of the current market price, our gross margins could decrease. In the past we experienced component shortages that adversely affected our financial results and in the future may continue to experience component shortages.

We depend on a limited source of suppliers for several key components. If we are unable to obtain these components on a timely basis, we will be unable to meet our customers' product delivery requirements, which would harm our business

We currently purchase several key components from a limited number of suppliers. If any of our limited source of suppliers become insolvent, cease business or experience capacity constraints, work stoppages or any other reduction or disruption in output, they may be unable to meet our delivery schedules. Our suppliers may enter into exclusive arrangements with our competitors, be acquired by our competitors, stop selling their products or components to us at commercially reasonable prices, refuse to sell their products or components to us at any price or be unable to obtain or have difficulty obtaining components for their products from their suppliers. If we do not receive critical components from our limited source of suppliers in a timely manner, we will be unable to meet our customers' product delivery requirements. Any failure to meet a customer's delivery requirements could materially adversely affect our business, operations, and financial condition and liquidity and could materially damage customer relationships.

Sales to communications service providers are especially volatile, and weakness in sales orders from this industry could harm our business, operations, financial condition and liquidity

Sales activity in the service provider industry depends upon the stage of completion of expanding network infrastructures, the availability of funding, and the extent to which service providers are affected by regulatory, economic and business conditions in the country of operations. Although some service providers may be increasing capital expenditures over the depressed levels that have prevailed over the last few years, weakness in orders from this industry could have a material adverse effect on our business, operations, financial condition and liquidity. Slowdowns in the general economy, overcapacity, changes in the service provider market, regulatory developments and constraints on capital availability have had a material adverse effect on many of our service provider customers, with many of these customers going out of business or substantially reducing their expansion plans. These conditions have materially harmed our business and operating results, and we expect that some or all of these conditions may continue for the foreseeable future. Finally, service provider customers typically have longer implementation cycles; require a broader range of services including design services; demand that vendors take on a larger share of risks; often require acceptance provisions, which can lead to a delay in revenue recognition; and expect financing from vendors. All these factors can add further risk to business conducted with service providers.

We rely on the availability of third party licenses

Many of our products are designed to include software or other intellectual property licensed from third parties. It may be necessary in the future to seek or renew licenses relating to various elements of the technology used to develop these products. We cannot assure you that our existing or future third-party licenses will be available to us on commercially reasonable terms, if at all. Our inability to maintain or obtain any third-party license required to sell or develop our products and product enhancements could require us to obtain substitute technology of lower quality or performance standards, or at greater cost.

Our intellectual property rights could prove difficult to protect and enforce

We generally rely on a combination of copyrights, patents, trademarks and trade secret laws and commercial agreements containing restrictions on disclosure and other appropriate terms to protect our intellectual property rights. We enter into confidentiality, employee, contractor and commercial agreements with our employees, consultants and corporate partners, and control access to and distribution of our proprietary information and use of our intellectual property and technology. Despite our efforts to protect our proprietary rights, unauthorized parties may attempt to copy or otherwise obtain and use our products, technology or intellectual property. Monitoring unauthorized use of our technology and intellectual property is difficult, and we do not know whether the steps we have taken will prevent unauthorized use of our technology, particularly in foreign countries or jurisdictions where laws may not protect our proprietary rights as extensively as in the United States. We cannot assure you that our pending, or any future, patent applications will be granted, that any existing or future patents will not be challenged, invalidated, or circumvented, or that any existing or future patents will be enforceable or that infringement by third parties will even be detected. While we are not dependent on any individual patents, if we are unable to protect our proprietary rights, we may find ourselves at a competitive disadvantage to others who need not incur the substantial expense, time and effort required to create the innovative products.

Claims that our current or future products or components contained in our products infringe the intellectual property rights of others may be costly and time consuming to defend and could adversely affect our ability to sell our products

The communications equipment industry is characterized by the existence of a large number of patents and frequent claims and related litigation regarding patent, copyright, trademark and other intellectual property rights, that may relate to technologies and related standards that are relevant to us. From time to time, we receive correspondence from companies claiming that our products are using technology covered by or related to the intellectual property rights of these companies and inviting us to discuss or demanding licensing or royalty arrangements for the use of the technology or seeking payment for damages, injunctive relief and other available legal remedies through litigation. These companies also include third-party non-practicing entities (also known as patent trolls) that focus on extracting royalties and settlements by enforcing patent rights through litigation or the threat of litigation. These companies typically have little or no product revenues and therefore our patents could provide little or no deterrence against such companies filing patent infringement lawsuits against us. In addition, third parties have initiated and could continue to initiate litigation against our manufacturers, suppliers, distributors or even our customers alleging infringement or misappropriation of their proprietary rights with respect to existing or future products, or components of our products. For example, various proceedings have been commenced against Broadcom Corporation and other parties alleging patent infringement in various jurisdictions, and in some cases the courts have issued rulings adverse to Broadcom enjoining Broadcom from offering, distributing, using or importing products that include the challenged intellectual property. Although we are not party to these proceedings, adverse rulings or injunctive relief awarded against Broadcom or other key suppliers of components for our products could result in delays or stoppages in the shipment of affected components, or require us to recall, modify or redesign our products containing such components. Regardless of the merit of claims against us or our manufacturers, suppliers, distributors or customers, intellectual property litigation can be time consuming and costly, and result in the diversion of the attention of technical and management personnel. Any such litigation could force us to stop manufacturing, selling, distributing, exporting, incorporating or using products or components that include the challenged intellectual property, or to recall, modify or redesign such products. In addition, if a party accuses us of infringing upon its proprietary rights, we may have to enter into royalty or licensing agreements, which may not be available on terms acceptable to us, if at all. If we are unsuccessful in any such litigation, we could be subject to significant liability for damages and loss of our proprietary rights. Any of these events or results could have a material adverse effect on our business, operations, financial condition and liquidity.

Adverse resolution of litigation may harm our business, operations, financial condition, and liquidity

We are a party to various lawsuits and claims in the normal course of our business. Litigation can be expensive, lengthy, and disruptive to normal business operations. Moreover, the results of complex legal proceedings are difficult to predict. An unfavorable resolution of a particular lawsuit could have a material adverse effect on our business, operations, financial condition, and liquidity.

Decreased effectiveness of share-based compensation could adversely affect our ability to attract and retain employees

We have historically used restricted stock and stock options as a key component of our employee compensation program in order to align the interests of our employees with the interests of our stockholders, encourage employee retention and provide competitive compensation and benefit packages. If the trading price of our common stock declines, this would reduce the value of our share-based compensation to our present employees and could adversely affect our ability to retain existing or attract prospective employees. Difficulties relating to obtaining stockholder approval of equity compensation plans could also make it harder or more expensive for us to grant share-based payments to employees in the future.

Our success largely depends on our ability to retain and recruit key personnel, and any failure to do so could harm our ability to meet key objectives

Our future success depends upon the continued services of our Chief Executive Officer and other key employees, and our ability to identify, attract and retain highly skilled technical, managerial, sales and marketing personnel who have critical industry experience and relationships that we rely on to build and operate our business. The loss of the services of any of our key employees, including our Chief Executive Officer, could delay the development and production of our products and negatively impact our ability to maintain customer relationships, which could harm our business, operations, financial condition and liquidity. Moreover, our inability to attract and retain sufficient qualified accounting personnel with expertise in generally accepted accounting principles in the United States (“U.S. GAAP”) following the Merger could adversely affect our ability to maintain an effective system of internal controls or our ability to produce reliable financial reports, which could materially and adversely affect our business.

Future sales of our common stock could lower our stock price and dilute existing stockholders

We issued a total of approximately 9.5 million shares (post reverse stock split) of our common stock to DNI in connection with the Merger, and could issue additional shares of common stock to finance future acquisitions through the use of equity. DNI has the right to require us to register with the SEC resales of the shares issued in connection with the Merger from time to time. In the event that DNI exercises its registration rights with respect to such shares, such shares would become eligible for resale upon registration. Additionally, shares of our common stock are available for future sale pursuant to awards granted under our equity incentive plans. Our stock price could suffer a significant decline as a result of any sudden increase in the number of shares sold in the public market or market perception that the increased number of shares available for sale will exceed the demand for our common stock.

The limitation of liability and indemnification provisions could harm our stockholders' investments and discourage them from suing our directors for breach of their fiduciary duties

The limitation of liability and indemnification provisions in our certificate of incorporation, as restated, may discourage stockholders from bringing a lawsuit against directors for breach of their fiduciary duties. They may also reduce the likelihood of derivative litigation against directors and officers, even though an action, if successful, might benefit us and our stockholders. A stockholder's investment may be harmed to the extent we pay the costs of settlement and damage awards against directors and officers pursuant to these indemnification provisions. Insofar as indemnification for liabilities under the Securities Act may be permitted to directors, officers or persons controlling us pursuant to the foregoing provisions, we have been informed that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable. There is no pending litigation or proceeding naming any of our directors or officers as to which indemnification is being sought, nor are we aware of any pending or threatened litigation that may result in claims for indemnification by any director or officer.

There is a limited public market of our common stock

There is a limited public market for our common stock. The average daily trading volume in our common stock during the 12 months ended December 31, 2018 was approximately 23,063 shares (post reverse stock split) per day. We cannot provide assurances that a more active trading market will develop or be sustained. As a result of low trading volume in our common stock, the purchase or sale of a relatively small number of shares of our common stock could result in significant price fluctuations and it may be difficult for holders to sell their shares without depressing the market price of our common stock.

Changes in government regulations could harm our business, operations, financial condition, and liquidity

Our operations are subject to various laws and regulations, including those regulations promulgated by the Federal Communications Commission ("FCC"). The FCC has jurisdiction over the entire communications industry in the United States and, as a result, our existing and future products and our customers' products are subject to FCC rules and regulations. Changes to current FCC rules and regulations and future FCC rules and regulations could negatively affect our business. Non-compliance with the FCC's rules and regulations would expose us to potential enforcement actions, including monetary forfeitures, and could damage our reputation among potential customers. The uncertainty associated with future FCC decisions may cause network service providers to delay decisions regarding their capital expenditures for equipment for broadband services. In addition, international regulatory bodies establish standards that may govern our products in foreign markets. The SEC has adopted disclosure rules regarding the use of "conflict minerals" mined from the Democratic Republic of Congo and adjoining countries and procedures regarding a manufacturer's efforts to prevent the sourcing of such conflict minerals. These rules may have the effect of reducing the pool of suppliers who can supply "conflict free" components and parts, and we may not be able to obtain "conflict free" products or supplies in sufficient quantities for our operations. Also, we may face reputational challenges with our customers, stockholders and other stakeholders if we are unable to sufficiently verify the origins for the conflict minerals used in our products. In addition, governments and regulators in many jurisdictions have implemented or are evaluating regulations relating to cyber security, privacy and data protection, which can affect the markets and requirements for networking and communications equipment. We are unable to predict the scope, pace or financial impact of government regulations and other policy changes that could be adopted in the future, any of which could negatively impact our operations and costs of doing business. Because of our smaller size, legislation or governmental regulations can significantly increase our costs and affect our competitive position. Changes to or future domestic and international regulatory requirements could result in postponements or cancellations of customer orders for our products and services, which could harm our business, operations, financial condition and liquidity. Further, we cannot be certain that we will be successful in obtaining or maintaining regulatory approvals that could, in the future, be required to operate our business.

Compliance or the failure to comply with current and future environmental regulations could cause us significant expense

We are subject to a variety of federal, state, local and foreign environmental regulations. If we fail to comply with any present or future regulations, we could be subject to liabilities, the suspension of production or prohibitions on the sale of our products. In addition, such regulations could require us to incur other significant expenses to comply with environmental regulations, including expenses associated with the redesign of any non-compliant product. From time to time new regulations are enacted, and it is difficult to anticipate how such regulations will be implemented and enforced and the impact that they could have on our operations or results. For example, in 2003 the European Union enacted the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive and the Waste Electrical and Electronic Equipment Directive, for implementation in European Union member states. We are aware of similar legislation that is currently in force or has been considered in the U. S., as well as other countries, such as Japan and China. Our failure to comply with any such regulatory requirements or contractual obligations could result in us being liable for costs, fines, penalties or third-party claims, and could jeopardize our ability to conduct business in countries or jurisdictions where such regulations apply.

Our business and future operating results are subject to global economic and market conditions

Market turbulence and weak economic conditions, as well as concerns about energy costs, geopolitical issues, the availability and cost of credit, business and consumer confidence, and unemployment could impact our business in a number of ways, including:

Potential deferment of purchases and orders by customers: Uncertainty about global economic conditions could cause consumers, businesses and governments to defer purchases in response to flat revenue budgets, tighter credit, decreased cash availability and weak consumer confidence. Accordingly, future demand for our products could differ materially from our current expectations.

Customers' inability to obtain financing to make purchases and/or maintain their business: Some of our customers require substantial financing in order to finance their business operations, including capital expenditures on new equipment and equipment upgrades, and make purchases from us. The potential inability of these customers to access the capital needed to finance purchases of our products and meet their payment obligations to us could adversely impact our business, operations, financial condition, and liquidity. While we monitor these situations carefully and attempt to take appropriate measures to protect ourselves, including factoring credit arrangements to financial institutions, it is possible that we may have to defer revenue until cash is collected or write-down or write-off uncollectible accounts. Such write-downs or write-offs, if large, could have a material adverse effect on our business, operations, financial condition, and liquidity. If our customers become insolvent due to market and economic conditions or otherwise, it could have a material adverse effect on our business, operations, financial condition and liquidity.

Negative impact from increased financial pressures on third-party dealers, distributors and retailers: We make sales in certain regions through third-party dealers, distributors and retailers. These third parties may be impacted, among other things, by a significant decrease in available credit. If credit pressures or other financial difficulties result in insolvency for these third parties and we are unable to successfully transition end customers to purchase our products from other third parties, or from us directly, it could adversely impact our business, operations, financial condition, and liquidity.

Negative impact from increased financial pressures on key suppliers: Our ability to meet customers' demands depends, in part, on our ability to obtain timely and adequate delivery of quality materials, parts and components from our suppliers. Certain of our components are available only from a single source or limited sources. If certain key suppliers were to become capacity constrained or insolvent, it could result in a reduction or interruption in supplies or a significant increase in the price of supplies and adversely impact our financial condition and results of operations. In addition, credit constraints of key suppliers could result in accelerated payment of accounts payable by us, impacting our cash flow.

We may experience material adverse impacts on our business, operations, financial condition, and liquidity as a result of weak or recessionary economic or market conditions in the United States, Korea, Germany, or the rest of the world.

Due to the international nature of our business, political or economic changes or other factors in a specific country or region could harm our future revenue, costs and expenses and financial condition

We currently have significant operations in India, Korea, and Vietnam, as well sales and technical support teams in various locations around the world. Many of our international sales may be denominated in foreign currencies. Because we do not currently engage in material foreign currency hedging transactions related to international sales, a decrease in the value of foreign currencies relative to the U.S. dollar could result in losses from transactions denominated in foreign currencies. We expect to continue expanding our international operations in the future. The successful management and expansion of our international operations requires significant human effort and the commitment of substantial financial resources. Further, our international operations may be subject to certain risks, disruptions and challenges that could materially harm our business, operations, financial condition, and liquidity, including:

- unexpected changes in laws, policies and regulatory requirements, including but not limited to regulations related to import-export control;
- trade protection measures, tariffs, embargoes and other regulatory requirements which could affect our ability to import or export our products into or from various countries;
- political unrest or instability, acts of terrorism or war in countries where we or our suppliers or customers have operations, including heightened security concerns stemming from North Korea in relation to our operations in Korea;
- political considerations that affect service provider and government spending patterns;
- differing technology standards or customer requirements;
- developing and customizing our products for foreign countries;
- fluctuations in currency exchange rates, foreign exchange controls and restrictions on cash repatriation;
- longer accounts receivable collection cycles and financial instability of customers;
- requirements for additional liquidity to fund our international operations;
- difficulties and excessive costs for staffing and managing foreign operations;
- ineffective legal protection of our intellectual property rights in certain countries;
- potentially adverse tax consequences; and
- changes in a country's or region's political and economic conditions.

In addition, some of our customer purchase agreements are governed by foreign laws and regulations, which may differ significantly from the laws and regulations of the United States. We may be limited in our ability to enforce our rights under these agreements and to collect damages, if awarded. Any of these factors could harm our existing international operations and business or impair our ability to continue expanding into international markets.

We face exposure to foreign currency exchange rate fluctuations

We conduct significant business in Korea, Japan, India, Vietnam, and Latin America, all of which subject us to foreign currency exchange rate risk.

We currently operate a limited hedging program to mitigate the impact of foreign currency exchange rate fluctuations. The use of such hedging activities may not offset any or more than a portion of the adverse financial effects of unfavorable movements in foreign currency exchange rates over the limited time the hedges are in place. Moreover, the use of hedging instruments may introduce additional risks if we are unable to structure effective hedges with such instruments, which could adversely affect our business, operations, financial condition, and liquidity.

As such, our results of operations and our cash flows could be impacted by changes in foreign currency exchange rates.

Industry consolidation may lead to increased competition and could harm our operating results

There has been a trend toward industry consolidation in the communications equipment market for several years. We expect this trend to continue as companies attempt to strengthen or hold their market positions in an evolving industry and as companies are acquired or are unable to continue operations. We believe that industry consolidation may result in stronger competitors that are better able to compete as sole-source vendors for customers. This could have a material adverse effect on our business, operations, financial condition, and liquidity. Furthermore, rapid consolidation could result in a decrease in the number of customers we serve. The loss of a major customer could have a material adverse effect on our business, operations, financial condition, and liquidity.

The market we serve is highly competitive and we could not be able to compete successfully

Competition in communications equipment markets is intense. These markets are characterized by rapid change, converging technologies and a migration to networking solutions that offer superior advantages. We are aware of many companies in related markets that address particular aspects of the features and functions that our products provide. Currently, our primary competitors in our core business include ADTRAN, Calix, Huawei, Nokia, and ZTE, among others. In our FiberLAN™ business, our competitors include Cisco, Nokia and Tellabs. In our Ethernet switching business, our competitors include Arris, Cisco, and Juniper. We also may face competition from other communications equipment companies or other companies that may enter our markets in the future. In addition, a number of companies have introduced products that address the same network needs that our products and solutions address, both domestically and internationally. Many of our competitors have longer operating histories, greater name recognition, larger customer bases and greater financial, technical, sales and marketing resources than we do and may be able to undertake more extensive marketing efforts, adopt more aggressive pricing policies and provide more customer financing than we can. In particular, we are encountering price-focused competitors from Asia, especially China, which places pressure on us to reduce our prices. If we are forced to reduce prices in order to secure customers, we may be unable to sustain gross margins at desired levels or achieve profitability. Competitive pressures could result in increased pricing pressure, reduced profit margins, 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. Moreover, our competitors may foresee the course of market developments more accurately than we do and could develop new technologies that render our products less valuable or obsolete.

If we are unable to compete successfully against our current and future competitors, we may have difficulty obtaining or retaining customers, and we could experience price reductions, order cancellations, increased expenses and reduced gross margins, any of which could have a material adverse effect on our business, operations, financial condition, and liquidity.

If we experience a significant disruption in, or breach in security of, our information technology systems, our business could be adversely affected

We rely on several centralized information technology systems to provide products and services, maintain financial records, process orders, manage inventory, process shipments to customers and operate other critical functions. If we experience a prolonged system disruption in the information technology systems that involve our interactions with customers or suppliers, it could result in the loss of sales and customers and significant incremental costs, which could adversely affect our business. In addition, our information technology systems could be susceptible to damage, disruptions or shutdowns due to power outages, hardware failures, computer viruses, attacks by computer hackers, telecommunication failures, user errors, catastrophes or other unforeseen events. Furthermore, security breaches of our information technology systems could result in the misappropriation or unauthorized disclosure of confidential information belonging to the company or our employees, partners, customers or suppliers, which could result in significant financial, legal or reputational damage to the company.

Threats from cybersecurity attacks, computer viruses or acts of terrorism could disrupt our operations and harm our business, operations, financial condition, and liquidity

Despite our implementation of network security measures, our network could be vulnerable to cybersecurity attacks, computer viruses, break-ins and similar disruptions. Cybersecurity attacks, in particular, are evolving and include, but are not limited to, malicious software, attempts to gain unauthorized access to data, and other electronic security breaches that could lead to disruptions in systems, unauthorized release of confidential or otherwise protected information and corruption of data. Any such event could have a material adverse effect on our business, operations, financial condition and liquidity.

Our daily business operations require us to retain sensitive data such as intellectual property, proprietary business information and data related to customers, suppliers and business partners within our networking infrastructure. The ongoing maintenance and security of this information is pertinent to the success of our business operations and our strategic goals.

Our networking infrastructure and related assets could be subject to unauthorized access by hackers, employee errors, or other unforeseen activities. Such issues could result in the disruption of business processes, network degradation and system downtime, along with the potential exploitation by third parties of our critical assets such as intellectual property, proprietary business information and data related to our customers, suppliers and business partners. To the extent that such disruptions occur, they may cause delays in the manufacture or shipment of our products and the cancellation of customer orders and, as a result, our business, operations, financial condition and liquidity could be materially and adversely affected resulting in a possible loss of business or brand reputation.

In addition, the effects of war or acts of terrorism could have a material adverse effect on our business, operations, financial condition and liquidity. Continued threats from acts of terrorism and the heightened security and military action in response to such threats threat, or future acts of terrorism, could cause further disruption to the economy and create further uncertainties in the economy. Energy shortages, such as shortages of gas or electricity, could have similar negative impacts. To the extent that such disruptions or uncertainties result in delays or cancellations of customer orders or the manufacture or shipment of our products, our business, operations, financial condition and liquidity could be materially and adversely affected.

Our business and operations are especially subject to the risks of earthquakes, hurricanes and other natural catastrophic events

Our corporate headquarters, including a significant portion of our research and development operations, are located in Northern California, a region known for seismic activity. Additionally, some of our facilities, including our manufacturing facility in Florida, are located near geographic areas that have experienced hurricanes in the past. For example, Hurricane Irma caused substantial damage and devastation in South Florida in September 2017, including in Seminole, the location of our manufacturing facility. Natural disasters, such as earthquakes, hurricanes, fires, floods or other catastrophic events, could severely affect our ability to conduct normal business operations, and consequently, our future operating results could be materially and adversely affected.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We lease our worldwide headquarters, which are located in Oakland, California. We also lease facilities for manufacturing, research and development purposes at locations in the United States including Seminole, Florida and Alpharetta, Georgia; and Hannover, Germany through the acquisition of Keymile and contract manufacturers located in China, India, Korea and Vietnam. We maintain smaller offices to provide sales and customer support at various domestic and international locations. We manufacture many of our more complex products at our manufacturing facility in Florida. We believe that our existing facilities are suitable and adequate for our present purposes.

ITEM 3. LEGAL PROCEEDINGS

From time to time, the Company is subject to various legal proceedings, claims and litigation arising in the ordinary course of business. While the outcome of these matters is currently not determinable, we do not expect that the ultimate costs to resolve any pending matters will have a material adverse effect on our consolidated financial position or results of operations. However, litigation is subject to inherent uncertainties, and unfavorable rulings could occur. If an unfavorable ruling were to occur, there exists the possibility of a material adverse impact on the results of operations of the period in which the ruling occurs, or future periods.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

EXECUTIVE OFFICERS OF THE REGISTRANT

Set forth below is information concerning our executive officers as of December 31, 2018.

<u>Name</u>	<u>Age</u>	<u>Office</u>
Il Yung Kim	62	Chief Executive Officer, President
Michael Golomb	43	Chief Financial Officer, Corporate Treasurer and Secretary

Il Yung Kim has served as our President and Chief Executive Officer since September 11, 2017. Mr. Kim joined us in connection with the Merger and has served as a member of our Board of Directors since September 9, 2016 and as Co-Chief Executive Officer from September 9, 2016 to September 11, 2017, and Acting Chief Financial Officer from September 11, 2017 to December 1, 2017. Prior to the Merger, Mr. Kim served as a consultant to DNI in connection with the Merger. From September 2014 to August 2016, Mr. Kim served as Chief Executive Officer of TukTak in Korea, an online startup company, which enables people with creative talents to collaborate and produce goods and services online. From December 2014 to August 2016, he also served as a strategic adviser for InMobi, a global mobile advertising platform provider. Previously, Mr. Kim held various positions with Korea Telecom, including President and executive board member from 2013 to 2014, and Chief Strategy Officer from 2010 to 2013. Mr. Kim commenced his career with British Telecom in 1982, where he held senior positions, including Vice President of Technology and Innovation and Programme Director and Head of Technology and Investment. Mr. Kim holds a Bachelor of Science (with Honors) in Electronic Engineering and a Master of Science Degree in Microwave and Modern Optics from University College, University of London.

Michael Golomb was appointed Chief Financial Officer, Corporate Treasurer and Corporate Secretary of DZS on December 1, 2017. Prior to joining DZS, Mr. Golomb co-founded and was the managing partner of ICO Governance Foundation, a non-profit decentralized global organization with a protocol-based global community mission that performs a self-regulatory function for ICOs in decentralized capital markets. From June 2015 to May 2017, he served as the Chief Financial Officer of Breathometer, a pioneer in breath analysis technology. From December 2013 to April 2015, Mr. Golomb was Chief Financial Officer and Board Member of BitFury Group Ltd., a market leading full-service Blockchain technology company, and one of the largest private infrastructure providers in the Blockchain ecosystem. From 2011 to 2013, Mr. Golomb was an independent Senior Financial Consultant. From 2008 to 2011, Mr. Golomb was Co-Founder, Board Member, and Co-President (Finance/Operations/Business Development) at Mayak Real Estate, a joint venture between Morgan Stanley, MCP, and Mr. Golomb. From 2005 to 2007, Mr. Golomb was Chief Financial Officer of Sistema Hals Real Estate Joint-Stock Company, a publicly traded company on the London Stock Exchange. From 2002 to 2005, Mr. Golomb was Sr. Finance Manager / Head of Compliance at Trimble Navigation Ltd., a global leader in GPS technology and a publicly traded company on NASDAQ. From 2000 to 2002, Mr. Golomb was Corporate Controller at Entegrity Solutions Corporation, a security software company. Prior to his public and private company experience, Mr. Golomb was a Senior Consultant at PricewaterhouseCoopers. Mr. Golomb holds a Master of Science in Management from Stanford University Graduate School of Business, a Masters of Business Administration from Santa Clara University, and a Bachelor of Science, with a double major in Economics and Diplomacy & World Affairs, from Occidental College. He is also a CPA (inactive) in California.

PART II

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

Our common stock is listed on the Nasdaq Capital Market under the symbol "DZSI" (formerly "ZHNE" prior to the Merger).

As of March 6, 2019, there were 412 registered stockholders of record. A substantially greater number of holders of DZS common stock are "street name" or beneficial holders, whose shares are held of record by banks, brokers or financial institutions.

Dividend Policy

We have never paid or declared any cash dividends on our common stock or other securities and do not anticipate paying cash dividends in the foreseeable future. Any future determination to pay cash dividends will be at the discretion of the Board of Directors, subject to any applicable restrictions under our debt and credit agreements, and will be dependent upon our financial condition, results of operations, capital requirements, general business condition and such other factors as the Board of Directors may deem relevant.

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data has been derived from our consolidated financial statements and should be read in conjunction with the consolidated financial statements and notes thereto, and with “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

The Merger has been accounted for as a reverse acquisition under which DNS was considered the accounting acquirer of DZS. As such, the selected financial data below comprises the operating results of DNS and its consolidated subsidiaries for periods through September 8, 2016 and DZS and its consolidated subsidiaries for periods on or after September 9, 2016, the effective date of the Merger.

	Year Ended December 31,		
	2018	2017	2016
(in thousands, except per share data)			
Statement of Comprehensive Income (Loss) Data:			
Net revenue - third parties	\$ 276,718	\$ 215,732	\$ 121,670
Net revenue - related parties	5,630	31,382	28,634
Total net revenue	282,348	247,114	150,304
Gross profit	91,331	82,765	41,706
Total operating expenses	84,151	82,043	54,755
Operating income (loss)	7,180	722	(13,049)
Interest income	264	129	183
Interest expense	(1,738)	(1,019)	(830)
Other expense, net	(1,146)	(731)	(145)
Income (loss) before income taxes	4,560	(899)	(13,841)
Income tax (benefit) provision	1,724	(2,072)	1,487
Net income (loss)	2,836	1,173	(15,328)
Net income (loss) attributable to non-controlling interest	69	102	(2)
Net income (loss) attributable to DASAN Zhone Solutions, Inc.	\$ 2,767	\$ 1,071	\$ (15,326)
Basic earnings (loss) per share attributable to DASAN Zhone Solutions, Inc. (1)	\$ 0.17	\$ 0.07	\$ (1.32)
Diluted earnings (loss) per share attributable to DASAN Zhone Solutions, Inc. (1)	0.17	0.07	(1.32)
Weighted average shares outstanding used to compute basic net income (loss) per share (1)	16,482	16,383	11,637
Weighted average shares outstanding used to compute diluted net income (loss) per share (1)	16,746	16,396	11,637

(1) Basic net income (loss) per share was not different from the diluted net income (loss) per share (1) for the year ended December 31, 2016 because the effects of stock options and restricted stock units would have been anti-dilutive.

	As of December 31,	
	2018	2017
(in thousands)		
Balance Sheet Data:		
Cash, cash equivalents and restricted cash	\$ 35,648	\$ 31,412
Working capital	75,280	62,286
Total assets	190,007	159,127
Stockholders’ equity and non-controlling interest	77,854	73,767

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

Overview

We are a global provider of ultra-broadband network access solutions and communications platforms deployed by advanced Tier 1, 2 and 3 service providers and enterprise customers. We research, develop, test, sell, manufacture and support communications equipment in five major areas: broadband access, Ethernet switching, mobile backhaul, Passive Optical LAN and SDN/NFV solutions:

- Our broadband access products offer a variety of solutions for carriers and service providers to connect residential and business customers, either using high-speed fiber or leveraging their existing deployed copper networks to offer broadband services to customer premises. Once our broadband access products are deployed, the service provider can offer voice, high-definition and ultra-high-definition video, high-speed internet access and business class services to their customers.
- Our Ethernet switching products provide a high-performance and manageable solution that bridges the gap from carrier access technologies to the core network. Our products support pure Ethernet switching as well as layer 3 IP and MPLS and are currently being developed for deployment as part of SDNs.
- Our mobile backhaul products provide a robust, manageable and scalable solution for mobile operators that enable them to upgrade their mobile backhaul systems and migrate from 3G networks to LTE and beyond. Our mobile backhaul products may be collocated at the radio access node base station and can aggregate multiple radio access node base stations into a single backhaul for delivery of mobile traffic to the radio access node network controller. We provide standard Ethernet/IP or MPLS interfaces and interoperate with other vendors in these networks.
- Our FiberLAN portfolio of POL products are designed for enterprise, campus, hospitality, and entertainment arena usage. Our FiberLAN portfolio includes our high-performance, high-bandwidth GPON OLTs connected to the industry's most diverse ONT product line, which include units with integrated PoE to power a wide range of PoE-enabled access devices.
- Our SDN/NFV strategy is to develop tools and building blocks that will allow service providers to migrate their networks' full complement of legacy control plane and data plane devices to a centralized intelligent controller that can reconfigure the services of the hundreds of network elements in real time for more controlled and efficient provision of bandwidth and latency across the network. The migration move to SDN/NFV will provide better service for end customers and a more efficient and cost-effective use of hardware resources for service providers.

Going forward, our key financial objectives include the following:

- Increasing revenue while continuing to carefully control costs;
- Continuing investments in strategic research and product development activities that will provide the maximum potential return on investment; and
- Minimizing consumption of our cash and cash equivalents.

Reverse Merger

On September 9, 2016, we acquired DNS through a reverse merger of a wholly owned subsidiary of Zhone Technologies, Inc. with and into DNS, with DNS surviving as our wholly owned subsidiary. In connection with the reverse merger, Zhone Technologies, Inc. changed its name to DASAN Zhone Solutions, Inc.

At the effective time of the Merger, all issued and outstanding shares of capital stock of DNS held by its sole shareholder, DNI, were canceled and converted into the right to receive shares of our common stock in an amount equal to 57.3% of the issued and outstanding shares of our common stock immediately following the Merger. Accordingly, at the effective time of the Merger, we issued 9,493,016 shares (post reverse stock split) of our common stock to DNI as consideration in the Merger, of which 949,302 shares (post reverse stock split) are being held in escrow as security for claims for indemnifiable losses in accordance with the merger agreement relating to the Merger. As a result, immediately following the effective time of the Merger, DNI held 57.3% of the outstanding shares of our common stock and the holders of our common stock immediately prior to the Merger retained, in the aggregate, 42.7% of the outstanding shares of our common stock. See Note 2 to the consolidated financial statements set forth in Part II, Item 8 of this Annual Report on Form 10-K for additional information regarding the Merger.

Common Control Transaction

On December 31, 2017, DNS (our wholly owned subsidiary) acquired 100% and 99.99% of the common stock of D-Mobile Limited (“D-Mobile”) and DASAN India Private Limited (“DASAN India”), respectively, from DNI. D-Mobile and DASAN India are resellers of our products in Taiwan and India, respectively. The consideration paid to DNI for the common stock is the net book value of D-Mobile and DASAN India at December 31, 2017. The net book value of D-Mobile and DASAN India was an aggregate of \$0.8 million. We accounted for these transactions as common control transactions, with the net assets transferred recorded at historical cost. The transactions did not result in a change in reporting entity and hence were accounted for prospectively.

Impact of Inflation and Changing Price

The financial statements and related data presented herein have been prepared in accordance with U.S. GAAP, which requires the measurement of financial position and operating results in terms of historical dollars without considering changes in the relative purchasing power of money over time due to inflation. Although our operations are influenced by general economic conditions, we do not believe that inflation had a material effect on our results of operations during our fiscal year ended December 31, 2018.

Critical Accounting Policies and Estimates

Management’s discussion and analysis of our financial condition and results of operations is based upon our consolidated financial statements, which have been prepared in accordance with U.S. GAAP. The preparation of these consolidated financial statements requires management to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. The policies discussed below are considered by management to be critical because changes in such estimates can materially affect the amount of our reported net income or loss. For all of these policies, management cautions that actual results could differ materially from such estimates under different assumptions or conditions.

Revenue Recognition

We recognize revenues when we transfer control of promised goods or services to our customers in an amount that reflects the consideration to which we expect to be entitled to in exchange for those goods or services.

We generate revenue primarily from sales of products and services, including, extended warranty service and customer support. Our revenue from product sales is recognized at a point in time when control of the goods is transferred to our customers, generally occurring upon shipment or delivery, dependent upon the terms of the underlying contract. Our revenue from services is generally recognized over time on a ratable basis over the contract term, using an output measure of progress, as the contracts usually provide our customers equal benefit throughout the contract period. We typically invoice customers for support contracts in advance, for periods ranging from one (1) to five (5) years.

Our transaction price is calculated as selling price net of variable consideration. Our sales to certain distributors are made under arrangements which provide our distributors with volume discounts, price adjustments, and other allowances under certain circumstances. These adjustments and allowances are accounted for as variable consideration. To estimate variable consideration, we analyze historical data, channel inventory levels, current economic trends and changes in our customer demand for our products, among other factors. Historically, variable consideration has not been a significant component of our contracts with customers.

Some of our contracts with customers contain multiple performance obligations. For these contracts, we account for the promises separately as individual performance obligations if they are distinct. In determining whether performance obligations meet the criteria for being distinct, we consider a number of factors, including the degree of interrelation and interdependence between obligations and whether or not the good or service significantly modifies or transforms another good or service in the contract. After identifying the separate performance obligations, we allocate transaction price to the separate performance obligations on a relative standalone selling price basis. Standalone selling prices for products are determined using either an adjusted market assessment or expected cost-plus margin. For customer support and extended warranty services, standalone selling price is primarily based on the prices charged to our customers. Our remaining performance obligations represent the transaction price allocated to performance obligations that are unsatisfied or partially unsatisfied as of the end of the reporting period. Unsatisfied and partially unsatisfied performance obligations primarily consist of backlog, which are products and services for which our customer purchase orders have been accepted and that are in the process of being delivered.

We record contract assets when it has a right to consideration and records accounts receivable when it has an “unconditional” right to consideration. We record deferred revenue when cash payments received (or unconditional rights to receive cash) in advance of fulfilling our performance obligations.

Our payment terms vary by the type and location of our customer and the products or services offered. The term between invoicing and when payment is due is not significant. For certain products or services and customer types, we require payment before the products or services are delivered to the customer.

Allowances for Sales Returns and Doubtful Accounts

We record an allowance for sales returns for estimated future product returns related to current period product revenue. The allowance for sales returns is recorded as a reduction of revenue and accrued and other liabilities at December 31, 2018 and allowance against our accounts receivable at December 31, 2017. We base our allowance for sales returns on periodic assessments of historical trends in product return rates and current approved returned products. If the actual future returns were to deviate from the historical data on which the reserve had been established, our future revenue could be adversely affected. We record an allowance for doubtful accounts for estimated losses resulting from the inability of customers to make payments for amounts owed to us. The allowance for doubtful accounts is recorded as a charge to general and administrative expenses. We base our allowance on periodic assessments of our customers' liquidity and financial condition through analysis of information obtained from credit rating agencies, financial statement reviews and historical collection trends. Additional allowances may be required in the future if the liquidity or financial condition of our customers deteriorates, resulting doubts about their ability to make payments.

Inventories

Inventories are stated at the lower of cost or net realizable value, with cost being determined using the first-in, first-out (FIFO) method. In assessing the net realizable value of inventories, we are required to make judgments as to future demand requirements and compare these with the current or committed inventory levels. Once inventory has been written down to its estimated net realizable value, its carrying value cannot be increased due to subsequent changes in demand forecasts. To the extent that a severe decline in forecasted demand occurs, or we experience a higher incidence of inventory obsolescence due to rapidly changing technology and customer requirements, we may incur significant charges for excess inventory.

Goodwill and Other Acquisition-Related Intangible Assets

Goodwill and other acquisition-related intangible assets not subject to amortization are tested annually for impairment using a two-step approach, and are tested for impairment more frequently if events or circumstances indicate that the asset might be impaired. An impairment loss is recognized to the extent that the carrying amount exceeds the asset's fair value. In the application of the impairment testing, we are required to make estimates of future operating trends and resulting cash flows and judgments on discount rates and other variables. Actual future results and other assumed variables could differ from these estimates. Our future operating performance will be impacted by the future amortization of intangible assets, potential charges related to purchased, in-process research and development for future acquisitions, and potential impairment charges related to goodwill. Accordingly, the allocation of the purchase price of the acquired companies to intangible assets and goodwill has a significant impact on our future operating results. The allocation process requires management to make significant estimates and assumptions, including estimates of future cash flows expected to be generated by the acquired assets and the appropriate discount rate for these cash flows. Should different conditions prevail, we would have to perform an impairment review that might result in material write-downs of intangible assets and/or goodwill. Other factors we consider important which could trigger an impairment review, include, but are not limited to, significant changes in the manner of use of our acquired assets, significant changes in the strategy for our overall business or significant negative economic trends. If this evaluation indicates that the value of an intangible asset may be impaired, an assessment of the recoverability of the net carrying value of the asset over its remaining useful life is made. If this assessment indicates that the cost of an intangible asset is not recoverable, based on the estimated undiscounted future cash flows or other comparable market valuations of the entity or technology acquired over the remaining amortization period, the net carrying value of the related intangible asset will be reduced to fair value and the remaining amortization period may be adjusted. Due to uncertain market conditions and potential changes in our strategy and product portfolio, it is possible that forecasts used to support our intangible assets may change in the future, which could result in additional non-cash charges that would adversely affect our results of operations and financial condition.

Business Combination

We allocate the fair value of purchase consideration to the tangible assets acquired, liabilities assumed and intangible assets acquired based on their estimated fair values. The excess of the fair value of purchase consideration over the fair values of these identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions, especially with respect to intangible assets and certain tangible assets such as inventory acquired as part of the Merger.

Critical estimates in valuing certain tangible and intangible assets include but are not limited to future expected cash flows from the underlying assets and discount rates. Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates.

Income Tax

We estimate our income tax provision or benefit in each of the jurisdictions in which we operate, including estimating exposures related to examinations by taxing authorities. We also make judgments regarding the realization of deferred tax assets, and establish valuation allowances where we believe it is more likely than not that future taxable income in certain jurisdictions will be insufficient to realize these deferred tax assets. Our estimates regarding future taxable income and income tax provision or benefit may vary due to changes in market conditions, changes in tax laws, or other factors. If our assumptions, and

consequently our estimates, change in the future, the valuation allowances we have established may be increased or decreased, potentially impacting future income tax expense.

RESULTS OF OPERATIONS

We list in the table below the historical consolidated statement of comprehensive income (loss) as a percentage of total net revenue for the periods indicated.

	Year ended December 31,		
	2018	2017	2016
Net revenue:			
Third parties	98%	87%	81%
Related parties	2%	13%	19%
Total net revenue	100%	100%	100%
Cost of revenue:			
Products and services - third parties	66%	56%	56%
Products and services - related parties	2%	10%	16%
Amortization of intangible assets	—	—	—
Total cost of revenue	68%	66%	72%
Gross profit	32%	34%	28%
Operating expenses:			
Research and product development	13%	14%	17%
Selling, marketing, general and administrative	17%	18%	18%
Amortization of intangible assets	—	1%	1%
Gain from sale of assets	—	—	—
Total operating expenses	30%	33%	36%
Operating income (loss)	3%	1%	(8)%
Interest income	—	—	—
Interest income (expense)	(1)%	—	(1)%
Other income (expense), net	—	—	—
Income (loss) before income taxes	2%	1%	(9)%
Income tax (benefit) provision	1%	(1)%	1%
Net income (loss)	1%	—	(10)%
Net income (loss) attributable to non-controlling interest	—	—	—
Net income (loss) attributable to DASAN Zhong Solutions, Inc.	1%	—	(10)%

2018 COMPARED WITH 2017

Net Revenue

The following table presents our revenues by source (in millions):

	2018	2017	Increase (Decrease)	% change
Products	\$ 269.3	\$ 235.1	\$ 34.2	14.5%
Services	13.0	12.0	1.0	8.3%
	<u>\$ 282.3</u>	<u>\$ 247.1</u>	<u>\$ 35.2</u>	<u>14.2%</u>

Net revenue increased by \$35.2 million in 2018 compared to 2017. The increase in net revenue was primarily due an increase in product sales that resulted from the combined impact of our broad geographical base and diverse product offerings. From a product net revenue perspective, we saw increased sales across our five product offerings (broadband access, Ethernet switching, mobile backhaul, POL and SDN).

Service revenue represents revenue from maintenance and other services associated with product shipments. The increase in service revenue was primarily related to a greater number of products under contract for maintenance and extended warranty.

Information about our net revenue by geography is summarized below (in millions):

	2018	2017	Increase (Decrease)	% change
Revenue by geography:				
United States	\$ 50.8	\$ 48.8	\$ 2.0	4.1%
Canada	4.4	5.6	(1.2)	-21.4%
Total North America	55.2	54.4	0.8	1.5%
Latin America	27.6	26.2	1.4	5.3%
Europe, Middle East, Africa	34.7	30.8	3.9	12.7%
Korea	76.0	81.5	(5.5)	-6.7%
Other Asia Pacific	88.8	54.2	34.6	63.8%
Total International	227.1	192.7	34.4	17.9%
Total	\$ 282.3	\$ 247.1	\$ 35.2	14.2%

Net revenue increased 14.2% or \$35.2 million to \$282.3 million for 2018 compared to \$247.1 million for 2017. The increase in net revenue was primarily due to increased products sales in Other Asia Pacific, primarily in India and Vietnam and in EMEA, offset by decreased product sales in Korea.

Across international markets, Asia-Pacific (including Korea) contributed approximately 58.4% of net revenue in 2018. We are seeing strong customer traction in EMEA and Latin America, which collectively accounted for approximately 22.1% of 2018 net revenue. International net revenue increased 17.9% or \$34.4 million to \$227.1 million for 2018 compared to \$192.7 million for 2017, and represented 80.4% of total net revenue compared with 78.0% in 2017. The increase in international net revenue was primarily related to increased product sales in Other Asia Pacific, primarily in India and Vietnam.

Additionally, we have increasingly seen customers signing longer multi-year deals across wide ranging deployments, including GPON deployments and expansions, EPON deployments, and VDSL/Vectoring deployments across the United States, EMEA, Latin America, and Asia Pacific.

We anticipate that our results of operations in any given period may depend to a large extent on sales to a small number of large accounts. As a result, our revenue for any quarter may be subject to significant volatility based upon changes in orders from one or a small number of key customers.

Cost of Revenue and Gross Profit

Total cost of revenue increased by \$26.7 million or 16.2% to \$191.0 million for 2018, compared to \$164.3 million for 2017. Total cost of revenue was 67.7% of net revenue for 2018, compared to 66.5% of net revenue for 2017, which resulted in a decrease in gross profit percentage to 32.3% in 2018 from 33.5% in 2017. The increase in total cost of revenue, as a percentage of sales, was primarily due to an increase in revenues in Other Asia Pacific customers that generated lower gross margin.

We expect that in the future our cost of revenue as a percentage of net revenue will vary depending on the mix and average selling prices of products sold, with longer term gross margin expansion expected to come from product cost reductions and manufacturing economies of scale resulting from the Merger. In addition, continued competitive and economic pressures could cause us to reduce our prices, adjust the carrying values of our inventory, or record inventory expenses relating to discontinued products and excess or obsolete inventory.

Research and Product Development Expenses

Research and product development expenses decreased by 2.1% or \$0.8 million to \$35.3 million for 2018 compared to \$36.1 million for 2017. The decrease in research and product development expenses was primarily due to cost containment initiatives and more focused product development activities. We intend to continue to invest in research and product development to attain our strategic product development objectives, while seeking to manage the associated costs through expense controls.

Selling, Marketing, General and Administrative Expenses

Selling, marketing, general and administrative expenses increased 8.2% or \$3.7 million to \$48.3 million for 2018 compared to \$44.6 million for 2017. Selling, marketing, general and administrative expenses include personnel costs for sales, marketing, administration, finance, information technology, human resources and general management as well as legal and accounting expenses, rent, utilities, trade show expenses and related travel costs. The increase in selling, marketing, general and administrative expenses was primarily due to higher personnel expenses due to increased headcount, as well as increased legal, accounting and outside service fees due to the Keymile Acquisition of \$1.4 million. As a percentage of sales, selling, marketing, general and administrative expenses were at 17.1% in 2018 and 18.1% in 2017.

Interest Expense, net

Interest expense, net for 2018 and 2017 was \$1.5 million and \$0.9 million, respectively. This increase was primarily related to an increase in our outstanding debt balance to \$45.9 million at December 31, 2018 from \$29.6 million at December 31, 2017. Interest rates on our borrowings were relatively flat during 2018 and 2017.

Other Expense, net

Other expense, net for 2018 was \$1.1 million compared to \$0.7 million in 2017. This includes \$1.3 million of currency exchange loss in 2018 compared to currency exchange loss of \$0.4 million in 2017.

Income Tax Provision (Benefit)

We recorded an income tax expense of \$1.7 million for the year ended December 31, 2018 compared to an income tax benefit of \$2.1 million for the year ended December 31, 2017. In fiscal year 2017, we released the valuation allowance against our net deferred tax assets in Korea. Management determined that it is more likely than not that the net deferred tax assets will be realized in this tax jurisdiction.

On December 22, 2017, President Trump signed the Tax Cuts and Jobs Act (the "Tax Act") into law. The Tax Act decreased the U.S. corporate federal income tax rate from 35% to 21% effective January 1, 2018. The reduction in tax rate resulted in a \$5.3 million reduction in net deferred tax assets at December 31, 2017. There was no impact on recorded deferred tax balances as the remeasurement of net deferred tax assets was offset by a corresponding change in valuation allowance. The Tax Act also imposes a one-time deemed repatriation tax on undistributed foreign earnings. We did not have a deemed repatriation due to our cumulative foreign earnings deficits. The Tax Act also includes a number of other provisions, including the elimination of loss carrybacks, limitations on the use of future losses, repeal of the Alternative Minimum Tax regime, and the introduction of a base erosion and anti-abuse tax. These provisions are not expected to have any immediate material effect on us.

OTHER PERFORMANCE MEASURES

In managing our business and assessing our financial performance, we supplement the information provided by our U.S. GAAP results with adjusted earnings before stock-based compensation, interest, taxes, and depreciation, or Adjusted EBITDA, a non-U.S. GAAP financial measure. We define Adjusted EBITDA as net income (loss) plus (i) interest expense, net, (ii) provision (benefit) for taxes, (iii) depreciation and amortization, (iv) stock-based compensation, and (v) material non-recurring transactions or events, such as merger and acquisition transaction costs or a gain (loss) on sale of assets or impairment of fixed assets. We believe that the presentation of Adjusted EBITDA enhances the usefulness of our financial information by presenting a measure that management uses internally to monitor and evaluate our operating performance and to evaluate the effectiveness of our business strategies. We believe Adjusted EBITDA also assists investors and analysts in comparing our performance across reporting periods on a consistent basis because it excludes the impact of items that we do not believe reflect our core operating performance.

Adjusted EBITDA has limitations as an analytical tool. Some of these limitations are:

- Adjusted EBITDA does not reflect our cash expenditures, or future requirements for capital expenditures or contractual requirements;
- Adjusted EBITDA does not reflect changes in, or cash requirements for, our working capital needs;
- Adjusted EBITDA does not reflect the interest expense, or the cash requirements necessary to service interest or principal payments, on our debts;
- Although depreciation and amortization are non-cash expenses, the assets being depreciated and amortized will often have to be replaced in the future, and Adjusted EBITDA does not reflect any cash requirements for such replacements;
- Non-cash compensation is and will remain a key element of our overall long-term incentive compensation package, although we exclude it as an expense when evaluating our ongoing operating performance for a particular period; and
- Other companies in our industry may calculate Adjusted EBITDA and similar measures differently than we do, limiting its usefulness as a comparative measure.

Because of these limitations, Adjusted EBITDA should not be considered in isolation or as a substitute for net income (loss) or any other performance measures calculated in accordance with U.S. GAAP or as a measure of liquidity. Management understands these limitations and compensates for these limitations by relying primarily on our U.S. GAAP results and using Adjusted EBITDA only as a supplemental measure.

Set forth below is a reconciliation of net income (loss) to Adjusted EBITDA, which we consider to be the most directly comparable GAAP financial measure to Adjusted EBITDA (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Net income (loss)	\$ 2,836	\$ 1,173	\$ (15,328)
Add (deduct):			
Interest expense, net	1,474	890	647
Income tax (benefit) provision	1,724	(2,072)	1,487
Depreciation and amortization	2,702	3,817	3,173
Stock-based compensation	2,080	902	336
Merger and acquisition transaction costs	1,404	—	1,273
Adjusted EBITDA	<u>\$ 12,220</u>	<u>\$ 4,710</u>	<u>\$ (8,412)</u>

LIQUIDITY AND CAPITAL RESOURCES

Our operations are financed through a combination of our existing cash, cash equivalents, available credit facilities, and sales of equity and debt instruments, based on our operating requirements and market conditions.

The Company had net income of \$2.8 million and \$1.2 million for the years ended December 31, 2018 and 2017. However, we had significant losses in prior years. As of December 31, 2018, we had an accumulated deficit of \$15.8 million and working capital of \$75.3 million. As of December 31, 2018, we had \$27.7 million in cash and cash equivalents, which included \$7.1 million in cash balances held by our international subsidiaries, and \$45.9 million in aggregate principal amount of short-term debt obligations, other long-term debt and long-term related party borrowings. In addition, as of December 31, 2018, we had \$3.8 million committed as security for letters of credit under our revolving credit facilities leaving \$22.5 million in aggregate borrowing availability under these facilities. Our current lack of liquidity could harm us by:

- increasing our vulnerability to adverse economic conditions in our industry or the economy in general;
- requiring substantial amounts of cash to be used for debt servicing, rather than other purposes, including operations;
- limiting our ability to plan for, or react to, changes in our business and industry; and
- influencing investor and customer perceptions about our financial stability and limiting our ability to obtain financing or acquire customers.

However, we plan to focus on cost management, operating efficiency and restrictions on discretionary spending. In addition, if necessary, we may sell assets, issue debt or equity securities or purchase credit insurance. We may also reduce the scope of our planned product development, reduce sales and marketing efforts and reduce our operations in low margin regions, including reductions in headcount. Since December 31, 2018, we obtained a new loan, as described more fully in Note (18) to the consolidated financial statements set forth in Part II, Item 8 of this Annual Report on Form 10-K, Subsequent Events. Based on our current plans and current business conditions, we believe that these measures along with our existing cash, cash equivalents and available credit facilities will be sufficient to satisfy our anticipated cash requirements for at least the next twelve (12) months from the date of this Annual Report on Form 10-K.

Our ability to meet our obligations as they become due in the ordinary course of business for the next twelve (12) months will depend on our ability to achieve forecasted results and our ability to access funds approved under existing facilities. Management's belief that they will achieve these results assumes that, among other things, we will continue to be successful in implementing our business strategy and that there will be no material adverse development in our business, liquidity or capital requirements. If one or more of these factors do not occur as expected, it could cause us to fail to meet our obligations as they come due.

Operating Activities

Net cash used for operating activities was \$12.2 million in 2018, compared to net cash provided by operating activities of \$1.9 million in 2017. The decline in cash from changes in operating assets and liabilities was primarily due to increase in accounts receivable and inventories balances at year-end.

Investing Activities

Cash flow used in investing activities of \$1.2 million in 2018 consists primarily of changes in the purchase of property, plant and equipment, compared with \$1.8 million of cash flow provided by investing activities in 2017.

Financing Activities

Cash flow from financing activities consist primarily of proceeds and repayments of borrowings. For fiscal year 2018, net cash provided by financing activities totaled \$19.0 million and consisted primarily of proceeds from short-term borrowings of \$55.5 million offset by repayments of borrowings of \$49.5 million and proceeds from borrowings from related party of \$12.1 million.

Cash Management

Our primary source of liquidity comes from our cash and cash equivalents, which totaled \$27.7 million at December 31, 2018, as well as our credit facilities, under which we had aggregate borrowings of \$45.9 million as of December 31, 2018. Our cash and cash equivalents as of December 31, 2018 included \$7.1 million in cash balances held by our international subsidiaries.

Debt Facilities

PNC Bank

On February 27, 2019, the Company and ZTI Merger Subsidiary III, Inc., a wholly owned subsidiary of the Company (“ZTI”, and together with the Company, the “Borrowers”), and certain direct and indirect subsidiaries of the Borrowers, as guarantors, entered into that certain Revolving Credit, Term Loan, Guaranty and Security Agreement (the “Domestic Credit Agreement”) and that certain Export-Import Revolving Credit, Guaranty and Security Agreement (the “Ex-Im Credit Agreement,” and together with the Domestic Credit Agreement, the “Credit Agreements”), in each case with PNC Bank, National Association (“PNC Bank”) and Citibank, N.A. as lenders, and PNC as agent for the lenders. We refer to such transactions as the “PNC Facility.”

The Credit Agreements provide for a \$25 million term loan and a \$15 million revolving line of credit (including subfacilities for Ex-Im transactions, letters of credit and swing loans) with a \$10 million incremental increase option. The amount the Company is able to borrow on the revolving line of credit at any time is based on eligible accounts receivable and other conditions, less certain reserves. Borrowings under the Credit Agreements bear interest at a floating rate equal to either the PNC prime rate or the LIBOR rate for the applicable period, plus a margin that is based on the type of advance.

The Company used a portion of the funds borrowed from the term loan under the Credit Agreements to (i) repay \$5.0 million existing related party indebtedness with DNI plus accrued interest, (ii) repay \$1.5 million revolving line of credit outstanding balance plus accrued interest and fees and cash collateralized \$3.6 million outstanding letter of credit under the Wells Fargo Credit Facility, and (iii) repay \$5.6 million short-term debt in Korea and Japan. The Company will use the remaining funds for ongoing working capital needs. The Company’s obligations under the Credit Agreements are secured by substantially all of the personal property assets of the Borrowers and the subsidiaries that guarantee the Credit Agreements, including their intellectual property.

The maturity date under the Credit Agreements is February 27, 2022, which reflects a three-year term. Repayment of the term loan shall in be in eight quarterly installments of \$625,000 beginning June 30, 2019, followed by quarterly installments of \$937,500 beginning on June 30, 2021, with all remaining unpaid principal and accrued interest due on the maturity date. Repayment of the revolving line of credit shall be due and payable on the maturity date.

The Credit Agreements contain certain covenants, limitations, and conditions with respect to the Company, including a maximum leverage ratio, a minimum fixed charge coverage ratio, and a minimum liquidity covenant, as well as financial reporting obligations, and usual and customary events of default. If an event of default occurs, the Agent and Lenders will be entitled to take various actions, including requiring the immediate repayment of all outstanding amounts under the Credit Agreements, terminating commitments to make additional advances and selling the assets of the Borrowers and their subsidiary guarantors to satisfy the obligations under the Credit Agreements. We make no assurances that we will be in compliance with the PNC Facility covenants in the future.

Wells Fargo

On July 12, 2018, we entered into the Amended and Restated Domestic Credit Agreement and the Amended and Restated Ex-Im Credit Agreement with Wells Fargo, which amended and replaced our previous senior secured revolving line of credit and letter of credit facilities with Wells Fargo and revised certain reporting and compliance provisions. The Wells Fargo Facility provided for a revolving line of credit of \$25.0 million (including up to \$5.0 million of letters of credit), with the amount that we were able to borrow based on eligible accounts receivable and inventory, less outstanding letter of credit usage. As of December 31, 2018, we had \$7.0 million in outstanding borrowings under the revolving line of credit, and \$1.3 million outstanding letter of credit usage. Based on our eligible accounts receivable and inventory, we had \$11.6 million of financing availability under the Wells Fargo Facility as of December 31, 2018. Subsequently, on January 8, 2019, we fully repaid the \$7.0 million outstanding borrowings under the revolving line of credit.

The revolving line of credit borrowed under the Wells Fargo Facility bore interest, payable monthly, at a floating rate equal to the three-month LIBOR plus a margin based on our average excess availability (as calculated under the Wells Fargo Facility). The interest rate on the Wells Fargo Facility was 5.1% at December 31, 2018. The unused commitment fee was 0.25% per annum and the unused letter of credit fee was 1.25% per annum. These are recorded as interest expenses in our financial results

presented in this Annual Report on Form 10-K.

Our obligations under the Wells Fargo Facility were secured by substantially all of the assets of the Company and our subsidiaries that guaranteed the Wells Fargo Facility, including intellectual property. The Wells Fargo Facility contained certain financial covenants, and customary affirmative and negative covenants.

As of December 31, 2018, we were in compliance with the covenants under the Wells Fargo Facility. In the past, we had violated covenants under the Wells Fargo Facility and received waivers from Wells Fargo for such violations. On July 3, 2017, we were in violation of the requirement to deliver audited financials for the year ended December 31, 2016, and we executed an agreement with Wells Fargo to extend the due date to September 27, 2017. As of December 31, 2017, we were in technical violation of covenants under the Wells Fargo Facility to pledge the stock of certain foreign subsidiaries and transfer certain funds to Wells Fargo bank accounts. On March 19, 2018, we executed an agreement with Wells Fargo, which cured the breach. Effective March 27, 2018, the Company and Wells Fargo modified the definition of Liquidity Trigger Event (as defined in the Wells Fargo Facility) from \$10.0 million to \$5.0 million on March 31, 2018 or \$10.0 million for subsequent quarters. Effective March 30, 2018, the Company and Wells Fargo amended the Wells Fargo Facility to extend the maturity date from March 31, 2019 to July 15, 2019.

On February 27, 2019, we repaid \$1.5 million outstanding borrowing on the revolving line of credit plus accrued interest and fees and cash collateralized \$3.6 million outstanding letters of credit under the Wells Fargo Facility with some of the proceeds of the PNC Facility. On February 27, 2019, we also terminated the Wells Fargo Facility.

Bank and Trade Facilities - Foreign Operations

Certain of our foreign subsidiaries have entered into various financing arrangements with foreign banks and other lending institutions consisting primarily of revolving lines of credit, trade facilities, term loans and export development loans. These facilities are renewed on an annual basis and are generally secured by a security interest in certain assets of the applicable foreign subsidiaries and supported by guarantees given by DNI or third parties. Payments under such facilities are made in accordance with the given lender's amortization schedules. As of December 31, 2018 and December 31, 2017, we had an aggregate outstanding balance of \$24.8 million and \$22.8 million, respectively, under such financing arrangements, and the interest rate per annum applicable to outstanding borrowings under these financing arrangements as of December 31, 2018 and December 31, 2017 ranged from 0% to 6.08% and 1.58% to 8.90%, respectively.

Related-Party Debt

In connection with the Merger, on September 9, 2016, we entered into a loan agreement with DNI for a \$5.0 million unsecured subordinated term loan facility. Under the loan agreement, we were permitted to request drawdowns of one or more term loans in an aggregate principal amount not to exceed \$5.0 million. As of December 31, 2018, \$5.0 million in term loans was outstanding under the facility. The interest rate as of December 31, 2018 under this facility was 4.6% per annum. On or about February 27, 2019, the entire outstanding balance on this term loan was repaid with some of the proceeds of the PNC Facility.

In February 2016, DNS California borrowed \$1.8 million from DNI for capital investment, which amount was outstanding as of December 31, 2018. This loan was due to mature in March 2018 with an option of renewal by mutual agreement, and bore interest at a rate of 4.6% per annum, payable annually. Effective January 31, 2018, we amended the terms of this loan to extend the repayment date from March 2018 to July 2019 and maintain an interest rate of 4.6%. On February 27, 2019, we amended the terms of this loan to extend the repayment date until 90 days after the maturity of the PNC Facility.

On March 27, 2018, DASAN Network Solutions, Inc., a corporation organized under the laws of the Republic of Korea ("DNS Korea") borrowed KRW 6.5 billion from DNI, of which \$4.5 million was repaid on August 8, 2018. As of December 30, 2018, \$1.3 million remained outstanding. The loan bears interest at a rate of 4.6% and is secured by certain accounts receivable of DNS Korea. On February 27, 2019, we amended the terms of this loan to extend the repayment date until 90 days after the maturity of the PNC Facility.

On December 27, 2018, we entered into a Loan Agreement with DNI for a \$6.0 million secured term loan with an interest rate of 4.6% per annum. On February 27, 2019, we amended the terms of the term loan to extend the repayment date until 90 days after the maturity of the PNC Facility and to terminate any security granted to DNI with respect to such loan.

Future Requirements and Funding Sources

Our fixed commitments for cash expenditures consist primarily of payments under operating leases, inventory purchase commitments, and payments of principal and interest for debt obligations.

From time to time, we may provide or commit to extend credit or credit support to our customers. This financing may include extending the terms for product payments to customers. Any extension of financing to our customers will limit the capital that we have available for other uses.

Our accounts receivable, while not considered a primary source of liquidity, represent a concentration of credit risk because a significant portion of the accounts receivable balance at any point in time typically consists of a relatively small number of customer account balances. As of December 31, 2018, two (2) customers, APSFL and SK Broadband, Inc., accounted for 11% and 10%, respectively, of our net accounts receivable. Our receivables from customers in countries other than the U.S represented 88% of accounts receivable. We do not currently have any material commitments for capital expenditures, or any other material commitments aside from operating leases for our facilities, inventory purchase commitments and debt.

Contractual Commitments and Off-Balance Sheet Arrangements

At December 31, 2018, our future contractual commitments by fiscal year were as follows (in thousands):

	Payments due by period					
	Total	2019	2020	2021	2022	2023 and thereafter
Operating leases	\$ 20,782	\$ 4,100	\$ 3,005	\$ 2,590	\$ 2,664	\$ 8,423
Purchase commitments	3,884	3,884	—	—	—	—
Short-term debt - bank and trade facilities	31,762	31,762	—	—	—	—
Long-term debt - related party	14,142	—	—	—	14,142	—
Total future contractual commitments	\$ 70,570	\$ 39,746	\$ 3,005	\$ 2,590	\$ 16,806	\$ 8,423

Operating Leases

The operating lease amounts shown above represent primarily off-balance sheet arrangements. For operating lease commitments, a liability is generally not recorded on our balance sheet unless the facility represents an excess facility for which an estimate of the facility exit costs has been recorded on our balance sheet, net of estimated sublease income. For operating leases that include contractual commitments for operating expenses and maintenance, estimates of such amounts are included based on current rates. Payments made under operating leases will be treated as rent expense for the facilities currently being utilized.

Purchase Commitments

The purchase commitments shown above represent non-cancellable inventory purchase commitments as of December 31, 2018.

Short-term Debt

The short-term debt obligations have been recorded as liabilities on our balance sheet, and comprise of \$31.8 million in outstanding borrowings under the credit facilities. The short-term debt obligation amount shown above represents scheduled principal repayments, but not the associated interest payments which may vary based on changes in market interest rates. At December 31, 2018, the interest rate per annum applicable to outstanding borrowings under the trade facilities of our foreign subsidiaries ranged from 0% to 6.08%. See above under “Cash Management” for further information about these facilities.

Long-term Debt - Related Party

As of December 31, 2018, we had borrowed an aggregate of \$14.1 million from DNI, which consisted of (a) a \$5.0 million unsecured subordinated term loan facility (On or about February 27, 2019, the entire outstanding balance on this term loan was paid with some of the proceeds of the PNC Facility), (b) a \$6.0 million secured term loan, which matures 90 days after the maturity of the PNC Facility, is pre-payable at any time by us without premium or penalty, (c) a \$1.8 million loan for capital investment which matures 90 days after the maturity of the PNC Facility, and (d) a secured loan outstanding of \$1.3 million which matures 90 days after the maturity of the PNC Facility. All four loans bear interest at a rate of 4.6% per annum.

See above under “Cash Management” for further information about our related-party debt.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Cash and Cash Equivalents

We consider all cash and highly liquid investments purchased with an original maturity of less than three (3) months to be cash equivalents.

Concentration of Credit Risk

Financial instruments which potentially subject us to concentrations of credit risk consist primarily of cash and cash equivalents, and accounts receivable. Cash and cash equivalents consist principally of financial deposits and money market accounts. Cash and cash equivalents are principally held with various domestic financial institutions with high credit standing. We perform ongoing credit evaluations of our customers and generally do not require collateral. Allowances are maintained for potential doubtful accounts.

For the year ended December 31, 2018, one (1) customer, SK Broadband, Inc., represented 11% of net revenue. For the year ended December 31, 2017, no customer represented 10% or more of net revenue. For the year ended December 31, 2016, three (3) customers, SK Broadband, Inc., DNI (a related party) and LG Uplus Corp., represented 16%, 14% and 10% of net revenue, respectively.

As of December 31, 2018, two (2) customers APSFL and SK Broadband, Inc., accounted for 11% and 10% of net accounts receivable, respectively. As of December 31, 2017, two (2) customers accounted for 20% (related party) and 10% of net accounts receivable, respectively. As of December 31, 2018 and 2017, receivables from customers in countries other than the United States represented 88% and 84%, respectively, of net accounts receivable.

Interest Rate Risk

Our exposure to market risk for changes in interest rates relates primarily to our outstanding short-term debt. As of December 31, 2018, our outstanding short-term debt balance was \$31.8 million. Amounts borrowed under the short-term debt bear interest ranging from 0% to 6.08% as of December 31, 2018. Assuming the outstanding balance on our variable rate debt remains constant over a year, a 1% increase in the interest rate would decrease pre-tax income and cash flow by approximately \$0.3 million.

Foreign Currency Risk

We transact business in various foreign countries, and a significant portion of our assets is located in Korea. We have sales operations throughout Asia, EMEA and Latin America. We are exposed to foreign currency exchange rate risk associated with foreign currency denominated assets and liabilities, primarily intercompany receivables and payables. Accordingly, our operating results are exposed to changes in exchange rates between the U.S. dollar and those currencies. During fiscal years 2017 and 2016, we did not hedge any of our foreign currency exposure.

We have performed a sensitivity analysis as of December 31, 2018 using a modeling technique that measures the impact on the balance sheet arising from a hypothetical 10% adverse movement in the levels of foreign currency exchange rates relative to the U.S. dollar, with all other variables held constant. The sensitivity analysis indicated that a hypothetical 10% adverse movement in foreign currency exchange rates would result in a foreign exchange loss of \$3.7 million at December 31, 2018. This sensitivity analysis assumes a parallel adverse shift in foreign currency exchange rates, which do not always move in the same direction. Actual results -may differ materially.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

DASAN ZHONG SOLUTIONS, INC. AND SUBSIDIARIES

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No financial statement schedules are required because all the relevant data is included elsewhere in this Annual Report on Form 10-K.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of DASAN Zhone Solutions, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of DASAN Zhone Solutions, Inc. and its subsidiaries (the “Company”) as of December 31, 2018 and 2017, and the related consolidated statements of comprehensive income (loss), of stockholders’ equity and non-controlling interest and of cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America.

Change in Accounting Principles

As discussed in Note 1 to the consolidated financial statements, the Company changed the manner in which it accounts for revenue from contracts with customers and the manner in which it accounts for restricted cash in 2018.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company’s consolidated financial statements 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 of these consolidated financial statements in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits 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. We believe that our audits provide a reasonable basis for our opinion.

/s/ PricewaterhouseCoopers LLP
San Jose, California
March 12, 2019

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

DASAN ZHONE SOLUTIONS, INC. AND SUBSIDIARIES

Consolidated Balance Sheets
(In thousands, except par value)

	As of December 31,	
	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	\$ 27,709	\$ 17,475
Restricted cash	7,003	12,425
Accounts receivable - trade, net of allowance for doubtful accounts of \$328 in 2018 and allowances for sale returns of \$445 and doubtful accounts of \$1,247 in 2017		
Third parties	71,034	48,257
Related parties	583	13,498
Other receivables		
Suppliers and others	12,923	12,494
Related parties	65	164
Inventories	33,868	25,344
Contract assets	11,381	—
Prepaid expenses and other current assets	4,185	3,652
Total current assets	168,751	133,309
Property, plant and equipment, net	5,518	5,873
Goodwill	3,977	3,977
Intangible assets, net	5,649	6,785
Deferred tax assets	2,752	2,954
Long-term restricted cash	936	1,512
Other assets	2,424	4,717
Total assets	<u>\$ 190,007</u>	<u>\$ 159,127</u>
Commitments and Contingencies		
Liabilities, Stockholders' Equity and Non-controlling Interest		
Current liabilities:		
Accounts payable - trade		
Third parties	36,865	31,441
Related parties	1,743	1,351
Short-term debt - Bank and trade facilities	31,762	19,790
Other payables		
Third parties	1,792	2,032
Related parties	1,281	1,956
Contract liabilities - current	8,511	—
Deferred revenue - current	—	3,279
Accrued and other liabilities	11,517	11,174
Total current liabilities	93,471	71,023
Long-term debts		
Bank and trade facilities	—	2,987
Related party	14,142	6,800
Contract liabilities - non-current	1,801	—
Deferred revenue - non-current	—	1,883
Other long-term liabilities	2,739	2,667
Total liabilities	112,153	85,360
Commitments and contingencies (Note 14)		
Stockholders' equity and non-controlling interest		
Common stock, authorized 36,000 shares, 16,587 and 16,410 shares outstanding as of December 31, 2018 and 2017 at a \$0.001 par value	16	16
Additional paid-in capital	93,192	90,198
Accumulated other comprehensive income (loss)	(192)	1,871
Accumulated deficit	(15,777)	(18,852)
Total stockholders' equity	77,239	73,233
Non-controlling interest	615	534
Total stockholders' equity and non-controlling interest	77,854	73,767
Total liabilities, stockholders' equity and non-controlling interest	<u>\$ 190,007</u>	<u>\$ 159,127</u>

(1) Authorized and outstanding share amounts reflect the one-for-five reverse stock split effected on February 28, 2017.

See accompanying notes to consolidated financial statements.

DASAN ZHONG SOLUTIONS, INC. AND SUBSIDIARIES
Consolidated Statements of Comprehensive Income (Loss)
(In thousands, except per share data)

	Years Ended December 31,		
	2018	2017	2016
Net revenue:			
Third parties	\$ 276,718	\$ 215,732	\$ 121,670
Related parties	5,630	31,382	28,634
Total net revenue	<u>282,348</u>	<u>247,114</u>	<u>150,304</u>
Cost of revenue:			
Products and services - third parties	185,709	138,457	84,376
Products and services - related parties	4,696	25,280	24,018
Amortization of intangible assets	612	612	204
Total cost of revenue	<u>191,017</u>	<u>164,349</u>	<u>108,598</u>
Gross profit	91,331	82,765	41,706
Operating expenses:			
Research and product development	35,306	36,080	25,778
Selling, marketing, general and administrative	48,321	44,641	27,725
Amortization of intangible assets	524	1,322	1,556
Gain from sale of assets	—	—	(304)
Total operating expenses	<u>84,151</u>	<u>82,043</u>	<u>54,755</u>
Operating income (loss)	7,180	722	(13,049)
Interest income	264	129	183
Interest expense	(1,738)	(1,019)	(830)
Other expense, net	(1,146)	(731)	(145)
Income (loss) before income taxes	4,560	(899)	(13,841)
Income tax (benefit) provision	1,724	(2,072)	1,487
Net income (loss)	2,836	1,173	(15,328)
Net income (loss) attributable to non-controlling interest	69	102	(2)
Net income (loss) attributable to DASAN Zhong Solutions, Inc.	<u>\$ 2,767</u>	<u>\$ 1,071</u>	<u>\$ (15,326)</u>
Foreign currency translation adjustments	(2,051)	4,702	(1,047)
Comprehensive income (loss)	785	5,875	(16,375)
Comprehensive income attributable to non-controlling interest	81	118	1
Comprehensive income (loss) attributable to DASAN Zhong Solutions, Inc.	<u>\$ 704</u>	<u>\$ 5,757</u>	<u>\$ (16,376)</u>
Basic earnings (loss) per share attributable to DASAN Zhong Solutions, Inc. (1)	<u>\$ 0.17</u>	<u>\$ 0.07</u>	<u>\$ (1.32)</u>
Diluted earnings (loss) per share attributable to DASAN Zhong Solutions, Inc. (1)	<u>\$ 0.17</u>	<u>\$ 0.07</u>	<u>\$ (1.32)</u>
Weighted average shares outstanding used to compute basic net income (loss) per share (1)	16,482	16,383	11,637
Weighted average shares outstanding used to compute diluted net income (loss) per share (1)	16,746	16,396	11,637

(1) All per share and weighted average share amounts have been adjusted to retroactively reflect the one-for-five reverse stock split effected on February 28, 2017.

See accompanying notes to consolidated financial statements.

DASAN ZHONE SOLUTIONS, INC. AND SUBSIDIARIES
Consolidated Statements of Stockholders' Equity and Non-Controlling Interest
Years ended December 31, 2018, 2017 and 2016
(In thousands)

	Common stock		Additional paid-in capital	Accumulated other comprehensive income (loss)	Accumulated deficit	Total stockholders' equity	Non-controlling interest	Total stockholders' equity and non-controlling interest
	Shares	Amount						
Balances as of December 31, 2015	9,493	\$ 9	\$ 47,680	\$ (1,765)	\$ (4,597)	\$ 41,327	\$ 138	\$ 41,465
Issuance of common stock	8	—	336	—	—	336	—	336
Shares of Legacy Zhone stock as of September 8, 2016 acquired through business combination	6,874	7	41,435	—	—	41,442	—	41,442
Net loss	—	—	—	—	(15,326)	(15,326)	(2)	(15,328)
Other comprehensive loss	—	—	—	(1,050)	—	(1,050)	3	(1,047)
Acquisition of controlling interest	—	—	(277)	—	—	(277)	277	—
Balances as of December 31, 2016	16,375	16	89,174	(2,815)	(19,923)	66,452	416	66,868
Exercise of stock options	35	—	122	—	—	122	—	122
Stock-based compensation	—	—	902	—	—	902	—	902
Net income	—	—	—	—	1,071	1,071	102	1,173
Other comprehensive income	—	—	—	4,686	—	4,686	16	4,702
Balances as of December 31, 2017	16,410	16	90,198	1,871	(18,852)	73,233	534	73,767
ASC 606 opening balance adjustment	—	—	—	—	308	308	—	308
Exercise of stock options and restricted stock grant	177	—	914	—	—	914	—	914
Stock-based compensation	—	—	2,080	—	—	2,080	—	2,080
Net income	—	—	—	—	2,767	2,767	69	2,836
Other comprehensive loss	—	—	—	(2,063)	—	(2,063)	12	(2,051)
Balance as of December 31, 2018	<u>16,587</u>	<u>\$ 16</u>	<u>\$ 93,192</u>	<u>\$ (192)</u>	<u>\$ (15,777)</u>	<u>\$ 77,239</u>	<u>\$ 615</u>	<u>\$ 77,854</u>

Share amounts reflect the one-for-five reverse stock split effected on February 28, 2017. See Note 1(h) for information on reverse stock split.

See accompanying notes to consolidated financial statements.

DASAN ZHONG SOLUTIONS, INC. AND SUBSIDIARIES

Consolidated Statements of Cash Flows
(In thousands)

	Years Ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net income (loss)	\$ 2,836	\$ 1,173	\$ (15,328)
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:			
Depreciation and amortization	2,702	3,817	3,173
Gain from sale of assets	—	—	(304)
Stock-based compensation	2,080	902	336
Provision for inventory write-down	835	1,848	547
Allowance for doubtful accounts	20	155	—
Provision for sales returns	1,343	1,220	466
Unrealized loss (gain) on foreign currency transactions	(1,229)	786	62
Deferred taxes	202	(2,915)	1,408
Changes in operating assets and liabilities:			
Accounts receivable	(10,287)	(4,507)	(2,350)
Inventories	(9,359)	6,233	(1,835)
Contract assets	(12,175)	—	—
Prepaid expenses and other assets	3,381	(3,526)	3,074
Accounts payable	5,702	(3,576)	4,488
Accrued and other liabilities	(3,727)	292	9,759
Contract liabilities	5,458	—	—
Net cash provided by (used in) operating activities	<u>(12,218)</u>	<u>1,902</u>	<u>3,496</u>
Cash flows from investing activities:			
Cash acquired through the Merger	—	—	7,013
Proceeds from short-term investments	—	1,463	—
Purchase of short-term investments	—	(429)	(1,034)
Cash acquired through common control transaction	—	1,880	—
Decrease in short-term and long-term loans to others	—	—	516
Increase in short-term and long-term loans to others	—	—	(214)
Proceeds from disposal of property, plant and equipment and other assets	2	6	10
Purchases of property, plant and equipment	(1,182)	(1,072)	(1,311)
Purchases of intangible assets	—	(90)	(61)
Net cash provided by (used in) investing activities	<u>(1,180)</u>	<u>1,758</u>	<u>4,919</u>
Cash flows from financing activities:			
Repayments of short-term borrowings	(45,033)	(24,447)	(27,336)
Repayments of related party term loan	(4,460)	—	—
Proceeds from short-term borrowings and line of credit	55,518	25,834	25,069
Proceeds from related party term loan	12,064	—	5,000
Proceeds from issuance of common stock	914	121	—
Net cash provided by financing activities	<u>19,003</u>	<u>1,508</u>	<u>2,733</u>
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	<u>(1,369)</u>	<u>1,701</u>	<u>(464)</u>
Net increase in cash and cash equivalents and restricted cash	4,236	6,869	10,684
Cash and cash equivalents and restricted cash at beginning of period	31,412	24,543	13,859
Cash and cash equivalents and restricted cash at end of period	<u>\$ 35,648</u>	<u>\$ 31,412</u>	<u>\$ 24,543</u>
Reconciliation of cash, cash equivalents and restricted cash to statement of financial position			
Cash and cash equivalents	\$ 27,709	\$ 17,475	\$ 17,893
Restricted cash	7,003	12,425	6,650
Long-term restricted cash	936	1,512	—
	<u>\$ 35,648</u>	<u>\$ 31,412</u>	<u>\$ 24,543</u>
Supplemental disclosure of cash flow information:			
Shares of the Company's common stock held in escrow	—	\$ 949	—
Cash paid during the period for:			
Interest - bank and trade facilities	\$ 1,332	696	\$ 663
Interest - related party	611	142	5
Income taxes	1,260	327	353

See accompanying notes to consolidated financial statements.

DASAN ZHONE SOLUTIONS, INC. AND SUBSIDIARIES

Notes to Consolidated Financial Statements

(1) Organization and Summary of Significant Accounting Policies

(a) Description of Business

DASAN Zhone Solutions, Inc. (referred to, collectively with its subsidiaries, as “DZS” or the “Company”) is a global provider of ultra-broadband network access solutions and communications platforms deployed by advanced Tier 1, 2 and 3 service providers and enterprise customers. The Company provides a wide array of reliable, cost-effective networking technologies, including broadband access, Ethernet switching, mobile backhaul, Passive Optical LAN and software-defined networks, to a diverse customer base that includes more than 900 customers in more than 80 countries worldwide.

DZS was incorporated under the laws of the state of Delaware in June 1999, under the name Zhone Technologies, Inc. On September 9, 2016, the Company acquired DASAN Network Solutions, Inc., a California corporation (“DNS”), through the merger of a wholly owned subsidiary of the Company with and into DNS, with DNS surviving as a wholly owned subsidiary of the Company (the “Merger”). At the effective time of the Merger, all issued and outstanding shares of capital stock of DNS held by DASAN Networks, Inc. (“DNI”) were canceled and converted into the right to receive shares of the Company's common stock in an amount equal to 57.3% of the issued and outstanding shares of the Company's common stock immediately following the Merger. In connection with the Merger, the Company changed its name from Zhone Technologies, Inc. to DASAN Zhone Solutions, Inc. For periods through September 8, 2016, Zhone Technologies, Inc. is referred to as “Legacy Zhone.”

The Company is headquartered in Oakland, California with flexible in-house production facilities in Seminole, Florida and Hannover, Germany through the acquisition of Keymile, and contract manufacturers located in China, India, Korea and Vietnam. The Company also maintains offices to provide sales and customer support at global locations.

(b) Risks and Uncertainties

The accompanying consolidated financial statements have been prepared in conformity with U.S. GAAP, assuming the Company will continue as a going concern.

The Company had net income of \$2.8 million and \$1.2 million for the years ended December 31, 2018 and 2017. However, the Company has incurred significant losses in prior years. As of December 31, 2018, the Company had an accumulated deficit of \$15.8 million and working capital of \$75.3 million. As of December 31, 2018, the Company had \$27.7 million in cash and cash equivalents, which included \$7.1 million in cash balances held by its international subsidiaries, and \$45.9 million in aggregate principal debt of which \$31.8 million was in current liabilities. In addition, as of December 31, 2018 the Company had \$3.8 million committed as security for letters of credit under its revolving credit facilities, leaving \$22.5 million in aggregate borrowing availability under these facilities.

The Company's liquidity could be impacted by:

- increasing its vulnerability to adverse economic conditions in its industry or the economy in general;
- requiring substantial amounts of cash to be used for debt servicing, rather than other purposes, including operations;
- limiting its ability to plan for, or react to, changes in its business and industry; and
- influencing investor and customer perceptions about its financial stability and limiting its ability to obtain financing or acquire customers.

The Company's ability to meet its obligations as they become due in the ordinary course of business for the next twelve (12) months will depend on its ability (i) to achieve forecasted results, (ii) access funds approved under existing or new credit facilities and/or raise additional capital through sale of the Company's common stock to the public and (iii) effectively manage inventory procurement. If the Company cannot raise additional funds when it needs or wants them, its operations and prospects could be negatively affected. Management believes that it will achieve forecasted results assumes that, among other things, the Company will continue to be successful in implementing its business strategy and that there will be no material adverse development in its business, liquidity or capital requirements. If one or more of these factors do not occur as expected, it could cause the Company to fail to meet its obligations as they come due.

Based on the Company's current plans and current business conditions, the Company believes that its existing cash, cash equivalents and available credit facilities will be sufficient to satisfy its anticipated cash requirements for at least the next twelve (12) months from the date of this Annual Report on Form 10-K.

(c) DNI Ownership

DNI owned approximately 57.2% of the outstanding shares of the Company's common stock as of December 31, 2018. As long as DNI and its affiliates hold shares of the Company's common stock representing at least a majority of the votes, DNI will be able to freely nominate and elect all the members of the Company's board of directors, subject to the provisions of the Company's bylaws and applicable requirements under Nasdaq listing rules and applicable laws. The directors elected by DNI will have the authority to make decisions affecting the Company's capital structure, including the issuance of additional capital stock or options, the incurrence of additional indebtedness, the implementation of stock repurchase programs, and the declaration of dividends. The interests of DNI may not coincide with the interests of the Company's other stockholders or with holders of the Company's indebtedness. DNI's ability to control all matters submitted to the Company's stockholders for approval limits the ability of other stockholders to influence corporate matters and, as a result, the Company may take actions that the Company's other stockholders or holders of the Company's indebtedness do not view as beneficial. See Note 2, Note 13 and Note 14 to the consolidated financial statements for additional information.

(d) Reclassifications

For the years ended December 31, 2017 and 2016, certain prior period statement of comprehensive income (loss) items have been reclassified to correctly reflect research and product development expenses and selling, marketing, general and administrative expenses of \$0.6 million and \$0.8 million in 2017 and of \$0.4 million and \$0.4 million in 2016, respectively, which were incorrectly classified as cost of revenue-products and services.

(e) Basis of Presentation

The consolidated financial statements are prepared in accordance with U.S. GAAP and include the accounts of the Company, its wholly owned subsidiaries and a subsidiary in which it has a controlling interest. All inter-company transactions and balances have been eliminated in consolidation.

As discussed more fully in Note 2, on September 9, 2016, the acquisition of DNS was consummated through the Merger of a wholly owned subsidiary of the Company with and into DNS, with DNS surviving as a wholly owned subsidiary of the Company.

At the effective time of the Merger, all issued and outstanding shares of capital stock of DNS held by DNI were canceled and converted into the right to receive shares of the Company's common stock in an amount equal to 57.3% of the issued and outstanding shares of the Company's common stock immediately following the Merger. As a result, immediately following the effective time of the Merger, DNI held 57.3% of the outstanding shares of the Company's common stock and the holders of the Company's common stock immediately prior to the Merger retained, in the aggregate, 42.7% of the outstanding shares of the Company's common stock.

On December 31, 2017, DNS (a wholly owned subsidiary of the Company) acquired 100% and 99.99% of the common stock of D-Mobile Limited ("D-Mobile") and DASAN India Private Limited (DASAN India), respectively, from DNI. D-Mobile and DASAN India are resellers of the Company's products in Taiwan and India, respectively. The consideration payable by the Company to DNI for the common stock is the net book value of D-Mobile and DASAN India at December 31, 2017. The net book value of D-Mobile and DASAN India was an aggregate of \$0.8 million. These transactions were accounted for by the Company as common control transactions, with the net assets transferred recorded at historical cost. The transactions did not result in a change in reporting entity and hence were accounted for prospectively.

(f) Consolidated Subsidiaries

Details of the Company's consolidated subsidiaries as of December 31, 2018 and 2017 are as follows:

	Location	Percentage of ownership (%)	
		December 31, 2018	December 31, 2017
Dasan Network Solutions, Inc. (U.S. subsidiary)	US	100%	100%
Dasan Network Solutions, Inc. (Korean subsidiary)	Korea	100%	100%
DASAN Network Solutions Japan Co., Ltd. (formerly: HandySoft Japan Co., Ltd.)	Japan	69.06%	69.06%
DASAN Vietnam Co., Ltd	Vietnam	100%	100%
D-Mobile	Taiwan	100%	100%
DASAN India	India	99.99%	99.99%

(g) Use of Estimates

The preparation of the consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ materially from those estimates.

(h) Reverse Stock Split

On February 28, 2017, the Company filed a Certificate of Amendment with the Delaware Secretary of State to amend the Company's Restated Certificate of Incorporation, which amendment effected a one-for-five reverse stock split of the Company's common stock and reduced the authorized shares of the Company's common stock from 180 million to 36 million. As a result of the reverse stock split, the number of shares of the Company's common stock then issued and outstanding was reduced from approximately 81.9 million to approximately 16.4 million. References to shares of the Company's common stock, stock options (and associated exercise price) and restricted stock units in this Annual Report on Form 10-K are provided on a post-reverse stock split basis.

(i) Revenue Recognition

The Company's revenue recognition policies from January 1, 2018 are as follows:

Revenue from contracts with customers is recognized when control of the promised goods or services is transferred to the customers, in an amount that reflects the consideration the Company expects to be entitled to in exchange for those goods or services.

The Company generates revenue primarily from sales of products and services, including, extended warranty service and customer support. Revenue from product sales is recognized at a point in time when control of the goods is transferred to the customer, generally occurring upon shipment or delivery dependent upon the terms of the underlying contract. Most of the Company's arrangements include customer acceptance provisions. Transfer of control upon obtaining the signed acceptance certificate from the customer, unless the Company can objectively demonstrate that customer acceptance is a formality. In those instances, where transfer of control occurs prior to obtaining the signed acceptance certificate, the Company considers a number of factors, including successful completion of customer testing to demonstrate that the delivered products meet all the acceptance criteria specified in the arrangement, its experience with the customer and its experience with other contracts for similar products. If the Company does not have history of meeting the specified acceptance criteria, transfer of control would not occur until receipt of customer acceptance certificate.

Revenue from services is generally recognized over time on a ratable basis over the contract term, using an output measure of progress, as the contracts usually provide the customer equal benefit throughout the contract period. The Company typically invoices customers for support contracts in advance, for periods ranging from one (1) to five (5) years.

Transaction price is calculated as selling price net of variable consideration. Sales to certain distributors are made under arrangements which provide the distributors with volume discounts, price adjustments, and other allowances under certain circumstances. These adjustments and allowances are accounted for as variable consideration. To estimate variable consideration, the Company analyzes historical data, channel inventory levels, current economic trends and changes in customer demand for the Company's products, among other factors. Historically, variable consideration has not been a significant component of the Company's contracts with customers.

Contracts with Multiple Performance Obligations

Some of the Company's contracts with customers contain multiple performance obligations. For these contracts, the Company accounts for the promised performance obligations separately as individual performance obligations if they are distinct. In determining whether performance obligations meet the criteria for being distinct, the Company considers a number of factors, including the degree of interrelation and interdependence between obligations and whether or not the good or service significantly modifies or transforms another good or service in the contract. After identifying the separate performance obligations, the transaction price is allocated to the separate performance obligations on a relative standalone selling price basis. Standalone selling prices for products are determined using either an adjusted market assessment or expected cost-plus margin. For customer support and extended warranty services, standalone selling price is primarily based on the prices charged to customers, when sold separately. Remaining performance obligations represent the transaction price allocated to performance obligations that are unsatisfied or partially unsatisfied as of the end of the reporting period. Unsatisfied and partially unsatisfied performance obligations primarily consist of backlog, which are products and services for which customer purchase orders have been accepted and that are in the process of being delivered.

Warranties

Products sold to customers include standard warranties, covering bug fixes, minor updates such that the product continues to function according to published technical specifications. These standard warranties are assurance type warranties and do not offer any services in addition to the assurance that the product will continue working as specified. Therefore, standard warranties are not considered separate performance obligations in the arrangement. Instead, the expected cost of warranty is accrued as expense in accordance with applicable guidance. Extended warranties are sold with certain products and include additional support services. The transaction price for extended warranties is accounted for as service revenue and recognized ratably over the life of the contract.

Contract Costs

Applying a practical expedient, the Company recognizes the incremental costs of obtaining contracts, which primarily consist of sales commissions, as an expense when incurred if the amortization period of the assets that otherwise would have been recognized is one year or less. These costs are included in sales and marketing expenses. If the incremental direct costs of obtaining a contract relate to a service recognized over a period longer than one year, such costs are capitalized and amortized in line with the related services over the period of benefit. As of December 31, 2018, such capitalized costs were not significant.

Financing

The Company's contracts do not include a significant financing component. The Company applies the practical expedient not to adjust the promised amount of consideration for the effects of a financing component if the Company expects, at contract inception, that the period between when the Company transfers a good or service to the customer and when the customer pays for the good or service will be one year or less.

Shipping and Handling

The Company has elected to account for shipping and handling activities that occur after the customer has obtained control of a good as a fulfillment cost rather than as an additional promised service. As a result, the Company accrues the costs of shipping and handling when the related revenue is recognized.

Unsatisfied Performance Obligations

The Company does not disclose the value of unsatisfied performance obligations for (i) contracts with an original expected length of one year or less and (ii) contracts for which the Company recognizes revenue at the amount to which the Company has the right to invoice for the services performed. The majority of the Company's performance obligations in its contracts with customers relate to contracts with duration of less than one year and therefore transaction price allocated to unsatisfied performance obligations included in contracts with duration of more than 12 months was not material.

Disaggregation of Revenue

The following table presents the revenues by source (in thousand):

	Years ended December 31,		
	2018	2017	2016
Revenue by products and services:			
Products	\$ 269,269	\$ 235,117	\$ 142,238
Services	13,079	11,997	8,066
Total	<u>\$ 282,348</u>	<u>\$ 247,114</u>	<u>\$ 150,304</u>

Information about our net revenue for North America and international markets for 2018, 2017 and 2016 is summarized below (in thousands):

	Years ended December 31,		
	2018	2017	2016
Revenue by geography:			
United States	\$ 50,795	\$ 48,840	\$ 16,872
Canada	4,413	5,631	1,967
Total North America	55,208	54,471	18,839
Latin America	27,596	26,206	9,604
Europe, Middle East, Africa	34,741	30,768	13,611
Korea	76,006	81,533	77,979
Other Asia Pacific	88,797	54,136	30,271
Total International	227,140	192,643	131,465
Total	\$ 282,348	\$ 247,114	\$ 150,304

For the years ended December 31, 2017 and 2016, the Company's revenue recognition policies are as follows:

The Company recognizes revenue when the earnings process is complete. The Company recognizes product revenue upon shipment of product under contractual terms, which transfer title to customers upon shipment, under normal credit terms, net of estimated sales returns and allowances at the time of shipment. Revenue is deferred if there are significant post-delivery obligations or if the fees are not fixed or determinable. When significant post-delivery obligations exist, revenue is deferred until such obligations are fulfilled. The Company's arrangements generally do not have any significant post-delivery obligations. If the Company's arrangements include customer acceptance provisions, revenue is recognized upon obtaining the signed acceptance certificate from the customer, unless the Company can objectively demonstrate that the delivered products or services meet all the acceptance criteria specified in the arrangement prior to obtaining the signed acceptance. In those instances where revenue is recognized prior to obtaining the signed acceptance certificate, the Company uses successful completion of customer testing as the basis to objectively demonstrate that the delivered products or services meet all the acceptance criteria specified in the arrangement. The Company also considers historical acceptance experience with the customer, as well as the payment terms specified in the arrangement, when revenue is recognized prior to obtaining the signed acceptance certificate. When collectability is not reasonably assured, revenue is recognized when cash is collected.

The Company makes certain sales to product distributors. These customers are given certain privileges to return a portion of inventory. Return privileges generally allow distributors to return inventory based on a percent of purchases made within a specific period of time. The Company recognizes revenue on sales to distributors that have contractual return rights when the products have been sold by the distributors, unless there is sufficient customer specific sales and sales returns history to support revenue recognition upon shipment. In those instances, when revenue is recognized upon shipment to distributors, the Company uses historical rates of return from the distributors to provide for estimated product returns.

The Company derives revenue primarily from stand-alone sales of its products. In certain cases, the Company's products are sold along with services, which include education, training, installation, and/or extended warranty services. As such, some of the Company's sales have multiple deliverables. The Company's products and services qualify as separate units of accounting and are deemed to be non-contingent deliverables as the Company's arrangements typically do not have any significant performance, cancellation, termination and refund type provisions. Products are typically considered delivered upon shipment. Revenue from services is recognized ratably over the period during which the services are to be performed.

For multiple deliverable revenue arrangements, the Company allocates revenue to products and services using the relative selling price method to recognize revenue when the revenue recognition criteria for each deliverable are met. The selling price of a deliverable is based on a hierarchy and if the Company is unable to establish vendor-specific objective evidence of selling price ("VSOE") it uses third-party evidence of selling price ("TPE"), and if no such data is available, it uses a best estimated selling price ("BESP"). In most instances, particularly as it relates to products, the Company is not able to establish VSOE for all deliverables in an arrangement with multiple elements. This may be due to infrequently selling each element separately, not pricing products within a narrow range, or only having a limited sales history. When VSOE cannot be established, the Company attempts to establish the selling price of each element based on TPE. Generally, the Company's marketing strategy differs from that of the Company's peers and the Company's offerings contain a significant level of customization and differentiation such that the comparable pricing of products with similar functionality cannot be obtained. Furthermore, the Company is unable to reliably determine what similar competitor products' selling prices are on a stand-alone basis. Therefore, the Company is typically not able to determine TPE for the Company's products.

When the Company is unable to establish selling price using VSOE or TPE, the Company uses BESP. The objective of BESP is to determine the price at which the Company would transact a sale if the product or service were sold on a stand-alone basis. The BESP of each deliverable is determined using average discounts from list price from historical sales transactions or cost plus margin approaches based on factors, including but not limited to, the Company's gross margin objectives, pricing practices and customer and market specific considerations.

Training, education and installation service arrangements are typically not material, are short term in nature and are largely completed shortly after delivery of the product.

Extended warranty services are priced based on the type of product and are sold in one to five year durations. Extended warranty services include the right to warranty coverage beyond the standard warranty period. In substantially all of the arrangements with multiple deliverables pertaining to arrangements with these services, the Company has used and intends to continue using VSOE to determine the selling price for the services. The Company determines VSOE based on its normal pricing practices for these specific services when sold separately.

(j) Allowances for Sales Returns and Doubtful Accounts

The Company records an allowance for sales returns for estimated future product returns related to current period product revenue. The allowance for sales returns is recorded as a reduction of revenue and accrued and other liabilities at December 31, 2018 and allowance against accounts receivable at December 31, 2017. The Company bases its allowance for sales returns on periodic assessments of historical trends in product return rates and current approved returned products. If the actual future returns were to deviate from the historical data on which the reserve had been established, the Company's future revenue could be adversely affected.

The Company records an allowance for doubtful accounts for estimated losses resulting from the inability of customers to make payments for amounts owed to the Company. The allowance for doubtful accounts is recorded as an expense to general and administrative expenses. The Company bases its allowance on periodic assessments of its customers' liquidity and financial condition through analysis of information obtained from credit rating agencies, financial statement review and historical collection trends. Additional allowances may be required in the future if the liquidity or financial condition of the Company's customers deteriorates, resulting in doubts about their ability to make payments.

Activity under the Company's allowance for doubtful accounts comprised as follows (in thousands):

	December 31,		
	2018	2017	2016
Balance at beginning of year	\$ 1,246	\$ 841	\$ 867
Charged to expense	20	155	—
Reversal of expense	(11)	—	—
Utilization/write offs/exchange rate differences	(927)	250	(26)
Balance at end of year	<u>\$ 328</u>	<u>\$ 1,246</u>	<u>\$ 841</u>

Activity under the Company's allowance for sales returns comprised as follows (in thousands):

	December 31,		
	2018	2017	2016
Balance at beginning of year	\$ 445	\$ 302	\$ —
Charged to revenue	1,343	1,220	466
Utilization/write offs/exchange rate differences	(1,082)	(1,077)	(164)
Balance at end of year	<u>\$ 706</u>	<u>\$ 445</u>	<u>\$ 302</u>

(1) Allowance for sales returns was historically presented as a contra-asset within accounts receivable on the Company's consolidated balance sheets. Upon the adoption of Topic 606, the Company presents the allowance for sales returns in Accrued and other liabilities (current).

(k) Inventories

Inventories are stated at the lower of cost or net realizable value, with cost being determined using the first-in, first-out method. In assessing the net realizable value of inventories, the Company is required to make judgments as to future demand requirements and compare these with the current or committed inventory levels. Once inventory has been written down to its estimated net realizable value, its carrying value cannot be increased due to subsequent changes in demand. To the extent that a severe decline in forecasted demand occurs, or the Company experiences a higher incidence of inventory obsolescence due to rapidly changing technology and customer requirements, the Company may incur significant expenses for excess and obsolete inventory. The Company also evaluates the terms of its agreements with its suppliers and establish accruals for estimated losses on adverse purchase commitments as necessary, applying the same lower of cost or market approach that is used to value inventory.

(l) Foreign Currency Translation

For operations outside the United States, the Company translates assets and liabilities of foreign subsidiaries, whose functional currency is the applicable local currency, at end of period exchange rates. Revenues and expenses are translated at periodic average rates. The adjustment resulting from translating the financial statements of such foreign subsidiaries, is included in accumulated other comprehensive income (loss,) which is reflected as a separate component of stockholders' equity. Gains and losses on foreign currency transactions are included in other income (expense) in the accompanying consolidated statement of comprehensive income (loss).

(m) Comprehensive Income (Loss)

There have been no items reclassified out of accumulated other comprehensive income (loss) and into net income (loss). The Company's other comprehensive income (loss) for the years ended December 31, 2018, 2017, and 2016 is comprised of foreign currency translation gains or losses.

(n) Concentration of Risk

Financial instruments, which potentially subject the Company to concentrations of credit risk, consist primarily of cash and cash equivalents and accounts receivable. Cash and cash equivalents consist principally of financial deposits and money market accounts. Cash and cash equivalents are principally held with various domestic financial institutions with high credit standing.

The Company's customers include competitive and incumbent local exchange carriers, competitive access providers, internet service providers, wireless carriers and resellers serving these markets. The Company performs ongoing credit evaluations of its customers and generally does not require collateral. Allowances are maintained for potential doubtful accounts.

For the year ended December 31, 2018, one (1) customer represented 11% of net revenue. For the year ended December 31, 2017, no customer represented 10% or more of net revenue. For the year ended December 31, 2016, three (3) customers represented 16%, 14% (a related-party) and 10% of net revenue, respectively.

As of December 31, 2018, two (2) customers represented 11% and 10% of net accounts receivable, respectively. As of December 31, 2017, two (2) customers accounted for 20% (a related-party) and 11% of net accounts receivable, respectively. As of December 31, 2018 and December 31, 2017, receivables from customers in countries other than the United States represented 88% and 84% of net accounts receivable, respectively.

(o) Property, Plant and Equipment

Property, plant, 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. The useful life of each asset category is as follows:

Asset Category	Useful Life
Furniture and fixtures	3 to 4 years
Machinery and equipment	3 to 10 years
Computers and software	3 years
Leasehold improvements	Shorter of remaining lease term or estimated useful lives

Upon retirement or sale, the cost and related accumulated depreciation of the asset are removed from the balance sheet and the resulting gain or loss is reflected in operating expenses.

(p) Long-Lived Assets

The Company reviews long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying value of an asset or asset group may not be recoverable. Recoverability of assets to be held and used is measured by comparing the carrying amount of an asset to the future net undiscounted cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated future net undiscounted cash flows, an impairment expense is recognized in the amount by which the carrying amount of the asset exceeds the fair value of the asset. Any assets to be disposed of would be separately presented in the balance sheet and reported at the lower of the carrying amount or fair value less costs to sell, and would no longer be depreciated. The assets and liabilities of a disposed group classified as held for sale would be presented separately in the appropriate asset and liability sections of the balance sheet.

The Company estimates the fair value of its long-lived assets based on a combination of market information primarily obtained from third-party quotes and online markets. In the application of impairment testing, the Company is required to make estimates of future operating trends and resulting cash flows and judgments on discount rates and other variables. Actual future results and other assumed variables could differ from these estimates. During the years ended December 31, 2018, 2017, and 2016, the Company recorded no impairment expenses related to the impairment of long-lived assets.

(q) Goodwill and Other Acquisition-Related Intangible Assets

Goodwill and other acquisition-related intangible assets not subject to amortization are tested annually for impairment using a two-step approach, and are tested for impairment more frequently if events and circumstances indicate that the asset might be impaired. An impairment loss is recognized to the extent that the carrying amount exceeds the asset's fair value. In the application of impairment testing, the Company is required to make estimates of future operating trends and resulting cash flows and judgments on discount rates and other variables. Actual future results and other assumed variables could differ from these estimates. The Company's future operating performance will be impacted by the future amortization of intangible assets, potential expenses related to purchased, in-process research and development for future acquisitions, and potential impairment expenses related to goodwill. Accordingly, the allocation of the purchase price of the acquired companies to intangible assets and goodwill has a significant impact on the Company's future operating results. The allocation process requires management to make significant estimates and assumptions, including estimates of future cash flows expected to be generated by the acquired assets and the appropriate discount rate for these cash flows. Should different conditions prevail, the Company would have to perform an impairment review that might result in material write-downs of intangible assets and/or goodwill. Other factors the Company considers important which could trigger an impairment review, include, but are not limited to, significant changes in the manner of use of its acquired assets, significant changes in the strategy for the Company's overall business or significant negative economic trends. If this evaluation indicates that the value of an intangible asset may be impaired, an assessment of the recoverability of the net carrying value of the asset over its remaining useful life is made. If this assessment indicates that the cost of an intangible asset is not recoverable, based on the estimated undiscounted future cash flows or other comparable market valuations of the entity or technology acquired over the remaining amortization period, the net carrying value of the related intangible asset will be reduced to fair value and the remaining amortization period may be adjusted. Due to uncertain market conditions and potential changes in the Company's strategy and product portfolio, it is possible that forecasts used to support its intangible assets may change in the future, which could result in additional non-cash expenses that would adversely affect its results of operations and financial condition.

(r) Business Combination

The Company allocates the fair value of purchase consideration to the tangible assets acquired, liabilities assumed and intangible assets acquired based on their estimated fair values. The excess of the fair value of purchase consideration over the fair values of these identifiable assets and liabilities is recorded as goodwill. When determining the fair values of assets acquired and liabilities assumed, management makes significant estimates and assumptions, especially with respect to intangible assets and certain tangible assets such as inventory.

Critical estimates in valuing certain tangible and intangible assets include but are not limited to future expected cash flows from the underlying assets and discount rates. Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates.

(s) Stock-Based Compensation

The Company uses the Black Scholes model to estimate the fair value of options, which is affected by the Company's stock price as well as assumptions regarding a number of complex and subjective variables. These variables include the Company's expected stock price volatility over the term of the awards, actual and projected employee option exercise behaviors, risk-free interest rates and expected dividends. The expected stock price volatility is based on the weighted average of the historical volatility of the Company's common stock over the most recent period commensurate with the estimated expected life of the Company's stock options. The Company based its expected life assumption on its historical experience and on the terms and conditions of the stock awards granted. Risk-free interest rates reflect the yield on zero-coupon United States Treasury securities.

The value of the portion of the award that is ultimately expected to vest is recognized as expense over the requisite service periods in the Company's consolidated statement of comprehensive income (loss). The Company attributes the values of the stock-based compensation to expense using the straight-line method.

(t) Income Taxes

The Company uses the asset and liability method to account for income taxes. Under this method, deferred tax assets and liabilities are determined based on differences between the financial reporting and the income tax bases of assets and liabilities. Deferred tax assets and liabilities are measured using enacted tax rates and laws that will be in effect when the differences are expected to reverse. Valuation allowances are established, when necessary, to reduce deferred tax assets to the amount expected to be realized. In 2017, the valuation allowance against the Company's net deferred tax assets in Korea was released after management determined that it is more likely than not that the net deferred tax assets will be realized in this tax jurisdiction. The Company maintains a full valuation allowance on its U.S. net deferred tax assets.

In 2017, the Company adopted ASU 2015-17 and applied it prospectively as allowed by the standard. In accordance with the standard, the Company presents deferred tax assets and deferred tax liabilities as noncurrent in the consolidated balance sheet. The adoption of ASU 2015-17 did not have a material impact on the consolidated balance sheets and had no impact on the cash provided by or used in operations for any period presented.

(u) Net Income (Loss) per Share Attributable to DASAN Zhone Solutions, Inc.

Basic net income (loss) per share attributable to DASAN Zhone Solutions, Inc. is computed by dividing the net income (loss) attributable to DASAN Zhone Solutions, Inc. for the period by the weighted average number of shares of common stock outstanding during the period. The calculation of diluted net income (loss) per share attributable to DASAN Zhone Solutions, Inc. gives effect to common stock equivalents; however, potential common equivalent shares are excluded if their effect is antidilutive. Potential common stock equivalent shares are composed of incremental shares of common stock issuable upon the exercise of stock options.

(v) Shipping and Handling Costs

The Company records costs related to shipping and handling in cost of revenue for all periods presented.

(w) Research and Development Cost

Costs related to research and development, which primarily consists of labor and benefits, supplies, facilities, consulting, and outside service fees, are expensed as incurred.

(x) Cash and Cash Equivalents

Cash and cash equivalents consist of cash and short-term investments (if any) with maturities of less than three months.

(y) Warranty

The Company offers a standard warranty for its hardware products of one (1) year, with the option to purchase an extended warranty of up to five (5) years, depending on the product type. The Company recognizes estimated costs related to warranty activities upon product shipment or upon identification of a specific product failure. The Company recognizes estimated warranty 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 activities and the Company's 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 exposure.

(z) Recent Accounting Pronouncements

Recent Accounting Pronouncements Adopted

In May 2014, the FASB issued ASU No. 2014-09 "Revenue from Contracts with Customers" ("Topic 606"), which provides a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers. Topic 606 replaced most existing revenue recognition standards under U.S. GAAP, including ASC 605, Revenue Recognition ("Topic 605").

On January 1, 2018, the Company adopted Topic 606 and applied this guidance to all open contracts at the date of adoption using the modified retrospective method. The Company recognized the cumulative effect of initially applying Topic 606 as an adjustment to the balance of accumulated deficit at January 1, 2018. The comparative information has not been restated and continues to be reported under Topic 605.

The Company's adoption of Topic 606 primarily impacted the following:

- Topic 606 requires an allocation of revenue to performance obligations identified within an arrangement. Topic 605 restricted the allocation of revenue that is contingent on future deliverables to current deliverables, however, Topic 606 removes this restriction, to the extent that the future deliverables represent performance obligations that are distinct. Under Topic 606, the nature of the performance obligations identified within a contract impacts the allocation of the transaction price between deliverables.
- Some of the Company's contracts include customer acceptance terms, which provide protection to the customer by allowing it to either cancel a contract or force the Company to take corrective actions if products or services do not meet the requirements in the contract. Under Topic 606, customer acceptance that is considered a "formality", would result in revenue recognized when control of the product or service is transferred to customer, which is typically upon shipment or delivery dependent upon the terms of the underlying contract.

The following table summarizes the effects of Topic 606 on the Company's consolidated balance sheet at January 1, 2018 (in thousands):

	As of January 1, 2018		
	Balance after adoption of ASC 606	Adjustments	Balance without adoption of ASC 606
Assets			
Accounts receivable, net	\$ 62,099	\$ 344 (1)	\$ 61,755
Inventories	25,239	(105) (2)	25,344
Liabilities			
Contract liabilities - current	3,038	(241) (2)	3,279
Accrued and other liabilities	11,518	344 (1)	11,174
Contract liabilities - non-current	1,711	(172) (2)	1,883
Stockholders' equity			
Accumulated deficit	(18,544)	308	(18,852)

- (1) Allowance for sales returns was historically presented as a contra-asset within accounts receivable on the Company's consolidated balance sheets. Upon the adoption of Topic 606, the Company presents the allowance for sales returns in Accrued and other liabilities (current).
- (2) Represents the impact of allocation of transaction price to separate performance obligations in open contracts as of the adoption date on a relative standalone selling price basis and acceleration of revenue (and related costs) for contracts for which acceptance clauses are a formality.
- (3) Reported as deferred revenue in 2017

The following table summarizes the effects of Topic 606 on the Company's consolidated balance sheet as of December 31, 2018 (in thousands):

	As of December 31, 2018		
	As Reported	Adjustments	Balance without adoption of ASC 606
Assets			
Accounts receivable, net	\$ 71,617	\$ (11,383) (1) (3)	\$ 83,000
Inventories	33,868	62 (2)	33,806
Contract assets - current	11,381	11,381 (3)	—
Contract assets - non-current (included in other assets)	794	794 (3)	—
Liabilities			
Contract liabilities - current	8,511	(136) (2)	8,647
Accrued and other liabilities	11,517	694 (1)	10,823
Contract liabilities - non-current	1,801	59 (2)	1,742
Stockholders' equity			
Accumulated deficit	(15,777)	238	(16,015)

- (1) Allowance for sales returns was historically presented as a contra-asset within accounts receivable on the Company's consolidated balance sheets. Upon the adoption of Topic 606, the Company presents the allowance for sales returns in Accrued and other liabilities (current).

- (2) Represents the impact of allocation of transaction price to separate performance obligations in open contracts as of December 31, 2018 on a relative standalone selling price basis and acceleration of revenue (and related costs) for contracts for which acceptance clauses are a formality.
- (3) Represents conditional rights to consideration as of December 31, 2018.

The following table summarizes the effects of Topic 606 on the Company's consolidated statement of operations for the year ended December 31, 2018 (in thousands):

	For the year ended December 31, 2018		
	As Reported	Adjustments	Balance without adoption of ASC 606
Net revenue	\$ 282,348	\$ 176	\$ 282,172
Cost of revenue - product and services	191,017	(62)	191,079
Gross profit	91,331	238	91,093
Provision for income taxes	1,724	—	1,724
Net income	2,836	238	2,598

There was no impact on net revenue from related parties as a result of Topic 606.

Contract Balances

Topic 606 distinguishes between contract assets and accounts receivable based on whether receipt of the consideration is conditional on something other than the passage of time. The Company records contract assets when it has a right to consideration and records accounts receivable when it has an "unconditional" right to consideration. Contract liabilities consist of cash payments received (or unconditional rights to receive cash) in advance of fulfilling performance obligations.

The following table reflects the changes in contract balances for the year ended December 31, 2018 (in thousands):

	December 31, 2018	January 1, 2018	Amount Change	% change
Contract assets - current	\$ 11,381	\$ —	\$ 11,381	—
Contract assets - non-current	794	—	794	—
Contract liabilities - current	8,511	3,038	5,473	180%
Contract liabilities - non-current	1,801	1,711	90	5%

During the year ended December 31, 2018, contract liabilities - non-current increased by 5%, while contract liabilities - current increased by 180%. This was primarily as a result of changes in open contracts containing multiple performance obligations. As of December 31, 2018, contract assets increased as a result of the timing of certain events for the right to consideration to become unconditional. There were no significant changes in estimates during the year ended December 31, 2018 that would affect the contract assets and liabilities balances.

During the year ended December 31, 2018, \$3.0 million was recognized as revenue from the opening contract liabilities balance.

In March 2016, the FASB issued ASU 2016-09, *Improvements to Employee Share-Based Payment Accounting*, which requires entities to simplify several aspects of the accounting for share-based payment transactions, including income tax consequences, classification of awards as either equity or liabilities, and classification on statements of cash flows. The guidance was effective for the Company on January 1, 2017, and was adopted accordingly. The adoption of this standard had no material impact on the Company's consolidated financial statements.

In August 2016, FASB issued ASU 2016-15, *Statement of Cash Flows, Classification of Certain Cash Receipts and Cash Payments*, which addresses eight specific cash flow issues with the objective of reducing the existing diversity in practice. The updated guidance became effective for the Company on January 1, 2018 and was adopted accordingly. The adoption of this standard had no material impact on the Company's consolidated financial statements.

In November 2016, FASB issued ASU 2016-18, *Statement of Cash Flows, Restricted Cash*, which requires that a statement of cash flows to explain the change during the period in the total of cash, cash equivalents and amounts generally described as restricted cash and restricted cash equivalents. The updated guidance became effective for the Company beginning on January 1, 2018 and was adopted accordingly, using the retrospective approach. As a result, the Company no longer presents transfers between cash and cash equivalents and restricted cash in the consolidated cash flow statements. The consolidated statement of cash flows for the years ended December 31, 2017 and 2016, were revised to exclude \$5.9 million and \$2.1 million change in restricted cash from net cash used in investing activities and to include \$6.7 million and \$4.8 million in cash, cash equivalents and restricted cash, beginning of period and \$13.9 million and \$6.7 million in cash, cash equivalents and restricted cash, end of period, respectively.

In March 2018, the FASB issued ASU No. 2018-05, *Income Taxes (Topic 740), Amendments to SEC Paragraphs Pursuant to SEC Staff Accounting Bulletin No. 118*. The amendments add various SEC paragraphs pursuant to the issuance of SEC Accounting Bulletin No. 118 (“SAB 118”), Income Tax Accounting Implications of the Tax Act. The SEC issued SAB 118 in December 2017 to address concerns about reporting entities’ ability to timely comply with the accounting requirements to recognize all of the effects of the Tax Act in the period of enactment. SAB 118 allows disclosure that timely determination of some or all of the income tax effects from the Tax Act are incomplete by the due date of the financial statements and if possible to provide a reasonable estimate in December 31, 2017. In accordance with SAB 118, the Tax Act-related income tax effects that the Company initially reported as provisional estimates were refined as additional analysis was performed. The Company completed its analysis of the Tax Act’s income tax effects in the fourth quarter of 2018. There was no material impact to the consolidated financial statements at December 31, 2018.

Other recent accounting pronouncement

In February 2016, the FASB issued ASU 2016-02, *Leases*, which introduces the recognition of lease assets and lease liabilities by lessees for those leases classified as operating leases under previous guidance. ASU 2016-02 requires that lease arrangements longer than 12 months result in an entity recognizing an asset and liability. In August 2018, the FASB issued ASU 2018-11, Targeted Improvements to ASC 842, which includes an option to not restate comparative periods in transition and elect to use the effective date of ASC 842, Leases, as the date of initial application of transition. Based on the effective date, this guidance will apply, and the Company will adopt this ASU beginning on January 1, 2019 and plan to elect the transition option provided under ASU 2018-11. The Company expects this standard will have a material effect on its consolidated balance sheets with the recognition of new right of use assets and lease liabilities for all operating leases, as these leases typically have a non-cancelable lease term of greater than one year. The Company will expand its consolidated financial statement disclosures upon adoption of this standard.

In January 2017, FASB issued ASU 2017-04, *Simplifying the Test for Goodwill Impairment*, which simplifies the accounting for goodwill impairment. The updated guidance is effective for the Company on January 1, 2020, and will be adopted accordingly. Early adoption is permitted. The Company is currently assessing the potential impact of adopting this new guidance on its consolidated financial statements.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation—Stock Compensation (Topic 718): Scope of modification accounting*. The purpose of the amendment is to clarify which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting. The updated guidance became effective for the Company beginning on January 1, 2018 and was adopted accordingly. The adoption of this standard had no impact on the Company's consolidated financial statements.

In February 2018, the FASB issued ASU 2018-02, *Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income*. The amendments in this update allow a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act (the “Tax Act”). Consequently, the amendments eliminate the stranded tax effects resulting from the Tax Act. Because the amendments only relate to the reclassification of the income rate tax effect of the Tax Act, the underlying guidance that requires that the effect of a change in tax laws or rates be included in income from continuing operations is not affected. The amendments in this update are effective for all entities for fiscal years beginning after December 15, 2018 and interim periods in those years. The Company does not expect the impact of the new standard to have a material impact on its consolidated financial statements.

On August 28, 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820)*, which removes, modifies, and adds certain disclosure requirements related to fair value measurements in ASC 820. The Company is currently assessing the potential impact of adopting this new guidance on its consolidated financial statements.

(2) Merger

On September 9, 2016, the Company acquired DNS through the Merger of a wholly owned subsidiary of the Company with and into DNS, with DNS surviving as a wholly owned subsidiary of the Company. The Merger combines leading technology platforms with a broadened customer base.

At the effective time of the Merger, all issued and outstanding shares of capital stock of DNS held by DNI were canceled and converted into the right to receive shares of the Company's common stock in an amount equal to 57.3% of the issued and outstanding shares of the Company's common stock immediately following the Merger. Accordingly, at the effective time of the Merger, the Company issued 9,493,016 shares (post reverse stock split) of the Company's common stock to DNI as consideration in the Merger, of which 949,302 shares (post reverse stock split) are being held in escrow as security for claims for indemnifiable losses in accordance with the merger agreement relating to the Merger. As a result, immediately following the effective time of the Merger, DNI held 57.3% of the outstanding shares of the Company's common stock and the holders of the Company's common stock immediately prior to the Merger retained, in the aggregate, 42.7% of the outstanding shares of the Company's common stock.

As described in Note 1(e), the Company accounted for the Merger as a reverse acquisition under the acquisition method of accounting in accordance with ASC 805, "Business Combination." Consequently, for the purpose of the purchase price allocation DNS' assets and liabilities have been retained at their carrying values and Legacy Zhone's assets acquired, and liabilities assumed, by DNS (as the accounting acquirer in the Merger) have been recorded at their fair value measured as of September 9, 2016.

The total purchase consideration in the Merger is based on the number of shares of Legacy Zhone common stock and Legacy Zhone stock options vested and outstanding immediately prior to the closing of the Merger, and was determined based on the closing price of \$5.95 per share (post reverse stock split) of the Company's common stock on September 9, 2016. The total purchase consideration is calculated as follows (in thousands):

	<u>Shares</u>	<u>Estimated Fair Value</u>
Shares of Legacy Zhone stock as of September 8, 2016 (1)	6,874	\$ 40,902
Legacy Zhone stock options (1)	198	540
Total purchase consideration		<u><u>\$ 41,442</u></u>

(1) Amount presented has been adjusted to reflect the one-for-five reverse stock split effected on February 28, 2017.

The following table summarizes the allocation of the fair value of the consideration transferred as of the acquisition date (in thousands):

	<u>Fair Value as of December 31, 2016</u>
Cash and cash equivalents	\$ 7,013
Accounts receivable	18,510
Inventory	16,456
Prepaid expenses and other current assets	2,191
Property, plant and equipment	4,339
Other assets	125
Identifiable intangible assets	10,479
Goodwill	3,284
Accounts payable	(11,021)
Accrued and other liabilities	(7,089)
Other long-term liabilities	(2,845)
Total Indicated Fair Value of Assets	<u><u>\$ 41,442</u></u>

The goodwill was primarily attributed to people, geographical diversification and complementary products. The goodwill arising from the Merger is not tax deductible.

The Company considered the deferred tax liabilities caused by the Merger to be a source of income to support recoverability of acquired deferred tax assets, before considering the recoverability of the acquirer's existing deferred tax assets. Accordingly, the valuation allowance on the acquiree's deferred tax assets was reduced by the deferred tax liabilities caused by the Merger and accounted for as part of the purchase price allocation.

The Company recorded \$1.3 million in Merger related costs during the year ended December 31, 2016. These expenses are included in selling, marketing, general and administrative expense.

The following table presents the fair values of the acquired intangible assets at the effective date of the Merger (in thousands, except years):

	Useful life (in Years)	Fair Value
Developed technology	5	\$ 3,060
Customer relationships	10	5,240
Backlog	1	2,179
Total Acquired Intangible Assets		<u>\$ 10,479</u>

The following unaudited pro forma condensed combined financial information for the year ended December 31, 2016 and 2015 gives effect to the Merger as if it had occurred at the beginning of 2015. The unaudited pro forma condensed combined financial information has been included for comparative purposes only and is not necessarily indicative of what the combined Company's financial position or results of operations might have been had the Merger been completed as of the date indicated. In addition, the unaudited pro forma condensed combined financial information does not purport to project the future financial position or results of operations of the combined company. The unaudited pro forma condensed combined financial information reflects adjustments related to the Merger, such as to record certain incremental expenses resulting from purchase accounting adjustments (such as amortization expenses in connection with the fair value adjustments to intangible assets and Merger related costs), for the year ended December 31, 2016 is as follows (in thousands):

Pro forma total net revenue	\$ 202,321
Pro forma net loss	(29,514)

For the period from September 9, 2016 (the effective date of the Merger) through December 31, 2016, the Company's income statement included \$29.0 million of net revenues and \$7.6 million of net loss from the Legacy Zhone business.

(3) Fair Value Measurement

The Company utilizes a fair value hierarchy that is intended to increase consistency and comparability in fair value measurements and related disclosures. The fair value hierarchy is based on inputs to valuation techniques that are used to measure fair value that are either observable or unobservable. Observable inputs reflect assumptions market participants would use in pricing an asset or liability based on market data obtained from independent sources while unobservable inputs reflect a reporting entity's pricing based upon their own market assumptions. The fair value hierarchy consists of the following three levels:

- Level 1 – Inputs are quoted prices in active markets for identical assets or liabilities.
- Level 2 – Inputs are quoted prices for similar assets or liabilities in an active market, quoted prices for identical or similar assets or liabilities in markets that are not active, inputs other than quoted prices that are observable and market-corroborated inputs which are derived principally from or corroborated by observable market data.
- Level 3 – Inputs are derived from valuation techniques in which one or more significant inputs or value drivers are unobservable.

The following financial instruments are not measured at fair value on the Company's consolidated balance sheet as of December 31, 2018 and 2017, but require disclosure of their fair values: cash and cash equivalents, short-term investments, accounts receivable, accounts payable and debt. The carrying values of financial instruments such as cash and cash equivalents, short-term investments, accounts receivable and accounts payable approximate their fair values based on their short-term nature. The carrying value of the Company's debt approximates their fair values based on the current rates available to the Company for debt of similar terms and maturities.

To manage certain exposures to currency fluctuations, the Company started a limited hedging program by entering into foreign currency forward contracts with maturities of one month to hedge a portion of its net outstanding foreign currency monetary assets and liabilities. These derivatives are recorded at fair value on the condensed consolidated balance sheet under "Other Current Assets" or "Accounts Payable - Trade" with changes in the fair value being recorded in "Other income (loss), net".

These derivative contracts are entered into with a single counterparty, and are not designated as hedging instruments under applicable accounting guidance. As such, all changes in the fair value of these derivative contracts are recorded in other income (loss), net on the condensed consolidated statements of comprehensive income (loss). These derivative contracts are intended to offset the foreign currency gains or losses associated with the underlying monetary assets and liabilities, and changes in the related derivative assets and liabilities balances are classified outside of operating income (loss), consistent with the related underlying foreign currency gain or loss.

These derivative contracts expose the Company to credit risk to the extent that the counterparty may be unable to meet the terms of the arrangement. The Company mitigates this credit risk by transacting with reputable financial institutions and entering into master netting arrangements, which permit net settlement of transactions with the same counterparty. While the contract or notional amount is often used to express the volume of foreign currency derivative contracts, the amounts potentially subject to credit risk are generally limited to the amounts, if any, by which the counterparties' obligations under the agreements exceed the obligations of the Company to the counterparties. The Company is not required to pledge, and is not entitled to receive, cash collateral related to these derivative instruments. The Company does not enter into derivative contracts for trading or speculative purposes. The Company's foreign currency contracts are classified within Level 2 because the valuation inputs are based on quoted prices and market observable data of similar instruments in active markets, such as currency spot and forward rates.

We regularly enter into forward contracts that are not designated to receive hedge accounting treatment. The purposes of these hedges are to reduce income statement volatility resulting from our foreign currency denominated assets and liabilities and to protect the cash required to settle those items. These hedges are recorded at fair value on the balance sheet under 'Other Current Assets' with changes in the fair value being recorded under 'Other Income and Expense.'

For the year ended December 31, 2018, the Company recorded foreign exchange forward contract loss of \$1.0 million.

All derivatives are entered into and exited at the end of the period, thus there is no fair value associated with any outstanding derivatives at December 31, 2018 and 2017.

As of December 31, 2018 and 2017, the Company had no derivative contracts, and no liability was included in accounts payable - trade.

(4) Cash and Cash Equivalents and Restricted Cash

As of December 31, 2018 and 2017, the Company's cash and cash equivalents comprised financial deposits. Restricted cash consisted primarily of cash restricted for performance bonds, warranty bonds and collateral for borrowings. At December 31, 2018, cash and cash equivalent included \$11.8 million intended for payment for the Keymile acquisition.

(5) Balance Sheet Detail

Balance sheet detail as of December 31, 2018 and 2017 is as follows (in thousands):

	<u>As of December 31,</u>	
	<u>2018</u>	<u>2017</u>
Inventories:		
Raw materials	\$ 15,688	\$ 12,671
Work in process	2,429	2,150
Finished goods	15,751	10,523
	<u>\$ 33,868</u>	<u>\$ 25,344</u>

Inventories provided as collateral for borrowings from Export-Import Bank of Korea amounted to \$9.5 million and \$11.4 million as of December 31, 2018 and 2017, respectively.

	<u>As of December 31,</u>	
	<u>2018</u>	<u>2017</u>
Property, plant and equipment, net:		
Furniture and fixtures	\$ 8,029	\$ 22,988
Machinery and equipment	3,553	5,455
Leasehold improvements	3,715	3,647
Computers and software	922	621
Other	982	1,007
	<u>17,201</u>	<u>33,718</u>
Less: accumulated depreciation and amortization	(11,271)	(27,584)
Less: government grants	(412)	(261)
	<u>\$ 5,518</u>	<u>\$ 5,873</u>

During the year ended December 31, 2018, the Company performed a physical inventory inspection and determined \$16.8 million of fully depreciated, non-useable furniture and fixtures were written off because these are no longer in use.

Depreciation expense associated with property, plant and equipment was \$1.6 million, \$1.9 million and \$1.3 million for the years ended December 31, 2018, 2017 and 2016, respectively.

The Company receives grants from various government entities mainly to support capital expenditures. Such grants are deferred and are generally refundable to the extent the Company does not utilize the funds for qualifying expenditures. Once earned, the Company records the grants as a contra amount to the assets and amortizes such amount over the useful lives of the related assets as a reduction to depreciation expense.

	As of December 31,	
	2018	2017
Accrued and other liabilities (in thousands):		
Accrued warranty	\$ 1,319	\$ 931
Accrued compensation	2,461	1,905
Other accrued expenses	7,737	8,338
	<u>\$ 11,517</u>	<u>\$ 11,174</u>

The Company accrues for warranty costs based on historical trends for the expected material and labor costs to provide warranty services. The Company's standard warranty period is one year from the date of shipment with the ability for customers to purchase an extended warranty of up to five years from the date of shipment. The following table summarizes the activity related to the product warranty liability (in thousands)

	As of December 31,	
	2018	2017
Balance at beginning of the year	\$ 931	\$ 878
Charged to cost of revenue	1,171	723
Claims and settlements	(791)	(695)
Foreign exchange impact	8	25
Balance at end of the year	<u>\$ 1,319</u>	<u>\$ 931</u>

(6) Goodwill and Intangible Assets

Goodwill as of December 31, 2018 and 2017 was as follows (in thousands):

	As of December 31,	
	2018	2017
Balance at beginning of the year	\$ 3,977	\$ 3,977
Less: accumulated impairment	—	—
Balance at end of the year	<u>\$ 3,977</u>	<u>\$ 3,977</u>

The Company did not recognize impairment loss on goodwill during the years ended December 31, 2018 and 2017.

Intangible assets as of December 31, 2018 and 2017 were as follows (in thousands):

	As of December 31, 2018		
	Gross Carrying Amount	Accumulated Amortization	Net
Developed Technology	\$ 3,060	\$ (1,428)	\$ 1,632
Customer Relationships	5,240	(1,223)	4,017
Backlog	2,179	(2,179)	—
Total intangible assets, net	<u>\$ 10,479</u>	<u>\$ (4,830)</u>	<u>\$ 5,649</u>

	As of December 31, 2017		
	Gross Carrying Amount	Accumulated Amortization	Net
Developed Technology	\$ 3,060	\$ (816)	\$ 2,244
Customer Relationships	5,240	(699)	4,541
Backlog	2,179	(2,179)	—
Total intangible assets, net	<u>\$ 10,479</u>	<u>\$ (3,694)</u>	<u>\$ 6,785</u>

Amortization expense associated with intangible assets for the years ended December 31, 2018, 2017 and 2016 amounted to \$1.1 million, \$1.9 million, and \$1.8 million, respectively. As of December 31, 2018, expected future amortization expense for the years indicated was as follows (in thousands):

Period	Expected Amortization Expense
2019	\$ 1,136
2020	1,136
2021	932
2022	524
2023 and thereafter	1,921
Total	<u>\$ 5,649</u>

(7) Debt

Wells Fargo Bank Facility

As of December 31, 2018, the Company had a \$25.0 million revolving line of credit facility (including up to \$5.0 million in letter of credit) with Wells Fargo (the “Wells Fargo Facility”). Under the Wells Fargo Facility, the Company has the option of borrowing funds at agreed upon interest rates. The amount that the Company is able to borrow under the Wells Fargo Facility varies based on eligible accounts receivable and inventory less amount committed as cash collateral for letter of credit. To maintain availability of funds under the Wells Fargo Facility, the Company pays a commitment fee on the unused portion. The commitment fee is 0.25% per annum and is recorded as interest expense.

As of December 31, 2018, the Company had \$7.0 million outstanding borrowings under its Wells Fargo Facility. Based on the Company's eligible accounts receivable and inventory and \$1.3 million committed as security for letters of credit, the Company had \$11.6 million of borrowing availability under the Wells Fargo Facility as of December 31, 2018. The amounts borrowed under the Wells Fargo Facility bear interest, payable monthly, at a floating rate equal to the three-month LIBOR plus a margin based on the Company's average excess availability as calculated under the Wells Fargo Facility. The interest rate on the Wells Fargo Facility was 5.1% at December 31, 2018. Subsequently, on January 8, 2019, the Company fully repaid the \$7.0 million outstanding borrowings under the revolving line of credit.

The Company's obligations under the Wells Fargo Facility were secured by substantially all of its assets and those of its subsidiaries that guarantee the Amended Wells Fargo Facility, including their intellectual property. The Wells Fargo Facility contains certain financial covenants, and customary affirmative and negative covenants. If the Company defaults under the Wells Fargo Facility due to a covenant breach or otherwise, Wells Fargo may, after the lapse of any applicable grace periods, be entitled to, among other things, require the immediate repayment of all outstanding amounts and sell the Company's assets to satisfy the obligations under the Wells Fargo Facility. As of December 31, 2018, the Company was in compliance with the covenants under the Wells Fargo Facility.

On February 27, 2019, the Company repaid \$1.5 million outstanding borrowing on the revolving line of credit plus accrued interest and fees and cash collateralized \$3.6 million outstanding letters of credit under the Wells Fargo Facility with some of the proceeds of the PNC Facility. On February 27, 2019, the Company also terminated the Wells Fargo Facility.

Bank and Trade Facilities - Foreign Operations

Certain of the Company's foreign subsidiaries have entered into various financing arrangements with foreign banks and other lending institutions consisting primarily of revolving lines of credit, trade facilities, term loans and export development loans. These facilities are renewed as they mature and are generally secured by a security interest in certain assets of the applicable foreign subsidiaries and supported by guarantees given by DNI or third parties. Payments under such facilities are made in accordance with the given lender's amortization schedules.

As of December 31, 2018 and 2017, the Company had an aggregate outstanding balance of \$24.8 million (included in short-term debt) and \$22.8 million (\$19.8 million included in short-term debt), respectively, under such financing arrangements. The maturity date and interest rates per annum applicable to outstanding borrowings under these financing arrangements were as listed in the tables below (in thousands).

		As of December 31, 2018			
		Maturity Date	Denomination	Interest rate (%)	Amount
Industrial Bank of Korea	Credit facility	01/02/2019 ~ 05/15/2019	USD	3.96 ~ 4.36	1,982
Industrial Bank of Korea	Trade finance	02/18/2019 ~ 02/25/2019	USD	5.31 ~ 6.08	1,920
Shinhan Bank	General loan	3/30/2019	KRW	6.06	2,862
NongHyup Bank	Credit facility	01/07/2019 ~ 04/29/2019	USD	3.71 ~ 4.50	2,053
The Export-Import Bank of Korea	Export development loan	07/01/2019	KRW	3.44	6,439
The Export-Import Bank of Korea	Import development loan	02/14/2019	USD	4.31	850
Korea Development Bank	General loan	08/08/2019	KRW	3.48	4,472
Korea Development Bank	Credit facility	02/07/2019 ~ 03/06/2019	USD	3.64 ~ 3.91	1,489
LGUPlus	General loan	06/17/2019	KRW	0	1,789
Shoko Chukin Bank	General loan	06/28/2019	JPY	1.33	906
					<u>\$ 24,762</u>

		As of December 31, 2017			
		Maturity Date	Denomination	Interest rate (%)	Amount
Industrial Bank of Korea	Credit facility	1/2/2018 - 5/2/2018	USD	2.89 - 3.26	\$ 2,328
Industrial Bank of Korea	Trade finance	1/2/2018 - 5/22/2018	USD	4.47 - 5.97	2,401
Shinhan Bank	General loan	3/30/2019	KRW	5.91	2,987
Shinhan Bank	Trade finance	2/19/2018- 3/26/2018	KRW	3.90 - 4.14	3,050
NongHyup Bank (Korea)	Credit facility	1/8/2018- 6/18/2018	USD	2.83 - 3.42	860
The Export-Import Bank of Korea	Export development loan	2/13/2018 & 6/29/2018	KRW	3.20 - 3.28	7,570
Mitsubishi Bank (Japan)	SoftBank AR factoring	1/31/2018 - 5/31/2018	JPY	1.58	1,872
Shinhan Bank (India)	General loan	4/24/2018 & 11/12/2018	INR	8.70 - 8.90	1,709
					<u>\$ 22,777</u>

On March 28, 2018, DNS (a wholly owned subsidiary of the Company) and Shinhan Bank extended the term of their \$2.9 million loan from March 30, 2018 to March 30, 2019.

As of December 31, 2018, the Company had \$5.5 million in outstanding borrowings and \$2.6 million committed as security for letters of credit under the Company's \$19.0 million credit facility with certain foreign banks.

(8) Executive Compensation

Il Yung Kim

In October 2017, the Company entered into an amended and restated employment agreement with Mr. Kim. This agreement has a term of three years expiring on October 10, 2020. Following the execution of this agreement, Mr. Kim was paid a one-time bonus of \$100,000.

During the term, Mr. Kim will perform the responsibilities as President, Chief Executive Officer, reporting to the Board of Directors, with such duties and responsibilities as are commensurate with such positions. Under the employment agreement, Mr. Kim's annual salary is \$400,000, and will be reviewed on at least an annual basis by the Compensation Committee. In addition, Mr. Kim is eligible to participate in a performance-based annual bonus program, to be earned and paid quarterly in equal installments. Mr. Kim's target bonus is equal to 100% of his annual salary. For the year ended December 31, 2018, the Company paid / accrued \$350,000 performance-based bonus to Mr. Kim upon achieving certain targets. The Company pays for or reimburse Mr. Kim for housing expenses up to maximum of \$6,500 per month. In addition, in the event that Mr. Kim's employment is terminated, the Company will pay or reimburse Mr. Kim for up to an additional \$30,000 in relocation expenses at such termination of his employment, unless he voluntarily resigns without "good reason" (as defined below). The relocation expenses to be provided to Mr. Kim will be grossed-up for taxes. Mr. Kim is also eligible to participate in all health benefits,

insurance programs, pension and retirement plans and other employee benefit and compensation arrangements generally available to our other officers.

Under Mr. Kim's employment agreement, Mr. Kim will receive certain compensation in the event that his employment is terminated by us for any reason other than by reason of Mr. Kim's death, disability, his termination for "cause" (as defined in the employment agreement), if Mr. Kim resigns for "good reason" (as defined in the employment agreement) or as a result of expiration of the term of his employment agreement (which we refer to as a Qualifying Termination). In the event of a

Qualifying Termination, Mr. Kim will be entitled to receive a lump sum payment equal to his annual salary as in effect immediately prior to the date of termination (or, if greater, \$400,000) plus the sum of the bonuses earned in the four most recently completed quarters. In addition, in the event of Mr. Kim’s Qualifying Termination, the vesting and exercisability of his stock options will accelerate on the date of termination.

Michael Golomb

In December 2017, the Company entered into an employment agreement with Mr. Golomb. This agreement has a term of three years expiring on December 1, 2020.

During the term, Mr. Golomb will perform the responsibilities as Chief Financial Officer, Corporate Treasurer and Corporate Secretary reporting to the Chief Executive Officer of the Company, with such duties and responsibilities as are commensurate with such positions. Under the employment agreement, Mr. Golomb’s annual salary is \$300,000, and will be reviewed on at least on an annual basis by the Compensation Committee. In addition, Mr. Golomb received 130,000 stock options which vest over three years with one third vesting on the first anniversary and the remaining two thirds vesting monthly thereafter. In July 2018, the Board of Directors approved for Mr. Golomb, to receive options to purchase up to 1% of the Company’s then outstanding shares.

Under Mr. Golomb’s employment agreement, Mr. Golomb will receive certain compensation in the event that his employment is terminated by the Company for any reason other than by reason of Mr. Golomb’s death, disability, or his termination for “cause” (as defined in the employment agreement), or in the event of expiration of the term of his employment agreement (each of which we refer to as a Qualifying Termination). In the event of a Qualifying Termination, including a Qualifying Termination following a change in control, Mr. Golomb will be entitled to receive a lump sum payment equal to his six months’ base salary as in effect immediately prior to the date of termination (or, if greater, \$150,000) and the vesting and exercisability of his stock options will accelerate on the date of termination.

Kirk Misaka

Pursuant to his separation and release agreement, in March 2018, the Company paid Mr. Misaka \$232,500. In addition, the exercise date of Mr. Misaka vested stock options was extended through September 11, 2018. Stock based compensation expense related to for Kirk Misaka was immaterial for the year ended December 31, 2018. During the year ended December 31, 2018, Mr. Miska exercised 54,534 shares of the Company ‘s common stock.

(9) Stockholders’ Equity

(a) Overview

The Company’s equity capitalization consisted of 36.0 million authorized shares of common stock, of which 16.6 million were outstanding at December 31, 2018.

(b) Stock-Based Compensation

As of December 31, 2018, the Company has one (1) stock-based compensation plan related to equity compensation (including equity compensation in the form of stock options, restricted stock and restricted stock units) and one (1) plan related to employee stock purchases.

The following table summarizes stock-based compensation expense for the years ended December 31, 2018, 2017 and 2016 (in thousands):

	Year ended December 31,		
	2018	2017	2016
Cost of revenue	\$ 18	\$ 1	\$ —
Research and product development	134	58	15
Selling, marketing, general and administrative	1,928	843	321
	<u>\$ 2,080</u>	<u>\$ 902</u>	<u>\$ 336</u>

2017 Stock Incentive Plans

The Company’s stock-based compensation plans are designed to attract, motivate, retain and reward employees, directors and consultants and align stockholder and employee interests.

The Company's former Amended and Restated 2001 Stock Incentive Plan (the "2001 Plan") expired in March 2017. On January 4, 2017, the Board of Directors approved, and at the 2017 Annual Meeting of Stockholders, the Company's stockholders approved, the DASAN Zhone Solutions, Inc. 2017 Incentive Award Plan. On February 12, 2018, the Board of Directors approved an amendment to the 2017 Incentive Award Plan, which is referred to herein as the "2017 Plan Amendment"). The Company's stockholders approved the 2017 Plan Amendment at the 2018 Annual Meeting of the Stockholders. The 2017 Incentive Award Plan, as amended by the 2017 Plan Amendment, is referred to herein as the "2017 Plan."

The 2017 Plan authorizes the issuance of stock options, restricted stock, restricted stock units, dividend equivalents, stock payment awards, stock appreciation rights, performance bonus awards and other incentive awards. The 2017 Plan authorizes the grant of awards to employees, non-employee directors and consultants of the Company and its subsidiaries. Under the 2017 Plan, stock options may be granted at an exercise price less than, equal to or greater than the fair market value on the date of grant, except that any stock options granted to a 10% stockholder must have an exercise price equal to at least 110% of the fair market value of the Company's common stock on the date of grant. The Board of Directors determine the term of each stock option, the option exercise price and the vesting terms. Stock options are generally granted at an exercise price equal to the fair market value on the date of grant, expiring seven (7) to ten (10) years from the date of grant and vesting over a period of four years.

The maximum number of shares of the Company's common stock which may be granted under the 2017 Plan is the sum of (i) 600,000 shares, plus (ii) any shares subject to awards granted under the 2001 Plan to the extent such shares become available for issuance under the 2017 Plan pursuant to its terms, plus (iii) any shares subject to an annual increase on each January 1 during the 10 year term of the 2017 Plan equal to the lesser of (x) 4% of the total shares of the Company's common stock outstanding (on an as-converted basis) and (y) such smaller amount as may be determined by the Board of Directors in its sole discretion. The annual increase on January 1, 2018 was 656,410 shares. In addition, the following annual limitations apply: (i) the maximum aggregate number of shares of the Company's common stock that may be subject to awards granted to any one participant during a calendar year is 4,000,000 shares; and (ii) the maximum aggregate amount of cash that may be paid to any one participant during any calendar year with respect to awards initially payable in cash is \$10 million. The number of shares of the Company's common stock that may be issued or transferred pursuant to awards granted under the 2017 Plan shall not exceed an aggregate of 8,000,000 shares.

The Company has estimated the fair value of stock-based payment awards on the date of grant using the Black Scholes pricing model, which is affected by the Company's stock price as well as assumptions regarding a number of complex and subjective variables. These variables include the Company's expected stock price volatility over the term of the awards, actual and projected employee option exercise behaviors, risk-free interest rate and expected dividends. The estimated expected term of options granted was determined based on historical option exercises. Estimated volatility was based on historical volatility and the risk free interest rate was based on U.S. Treasury yield in effect at the time of grant for the expected life of the options. The Company does not anticipate paying any cash dividends in the foreseeable future, and therefore used an expected dividend yield of zero in the option valuation model. Forfeitures are recognized as they occur.

The weighted average assumptions used to value option grants for the year ended December 31, 2018, 2017, and 2016 are as follows:

	Year ended December 31,		
	2018	2017	2016
Expected term (years)	4.88	4.87	4.78
Expected volatility	81.87%	81.32%	79.70%
Risk free interest rate	2.74%	1.92%	1.14%

The weighted average grant date fair value of options granted during the years ended December 31, 2018, 2017, and 2016 were \$6.49, \$3.90, and \$4.08, respectively.

The following table sets forth the summary of option activity under the stock option program for the year ended December 31, 2018 (in thousands, except per share data):

	Options Outstanding	Weighted Average Exercise Price (1)	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
Outstanding as of December 31, 2017	1,213	\$ 6.50		
Granted	836	9.86		
Canceled/Forfeited	(155)	8.00		
Exercised	(150)	6.08		
Outstanding as of December 31, 2018	<u>1,744</u>	8.00	8.65	10,378
Vested and expected to vest at December 31, 2018	<u>1,744</u>	8.00	8.65	10,378
Vested and exercisable at December 31, 2018	<u>488</u>	6.77	7.51	3,497

The aggregate intrinsic value represents the total pretax intrinsic value, based on the Company's closing stock price as of December 31, 2018 of \$13.91, per share which would have been received by the option holders had the option holders exercised their options as of that date.

The aggregate intrinsic value of awards exercised during the years ended December 31, 2018, 2017, and 2016 were \$0.6 million, \$76 thousand, and \$18 thousand, respectively.

As of December 31, 2018, there was \$6.5 million of unrecognized compensation costs which are recognized over a weighted average period of three (3) years.

The following table sets forth the summary of option activity under the stock option program for the year ended December 31, 2017 (in thousands, except per share data):

	Options Outstanding	Weighted Average Exercise Price (1)	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
Outstanding as of December 31, 2016	787	\$ 6.84		
Granted	733	6.01		
Canceled/Forfeited	(282)	6.57		
Exercised	(25)	4.91		
Outstanding as of December 31, 2017	<u>1,213</u>	6.50	7.83	\$ 3,586
Vested and expected to vest at December 31, 2017	<u>1,213</u>	6.50	7.83	3,586
Vested and exercisable at December 31, 2017	<u>310</u>	7.65	4.14	713

Restricted Stock Units

The following table sets forth the summary of restricted stock units activity under the stock award program for the year ended December 31, 2018 (in thousands, except per share data):

	RSU Outstanding	Weighted Average Grant Date Fair Value
Non-vested as of December 31, 2017	5	\$ 7.43
Granted	35	9.66
Canceled/Forfeited	—	—
Vested	(36)	9.56
Non-vested as of December 31, 2018	<u>4</u>	<u>7.50</u>

The following table sets forth the summary of restricted stock units activity under the stock award program for the year ended December 31, 2017 (in thousands, except per share data):

	RSU Outstanding	Weighted Average Grant Date Fair Value
Non-vested as of December 31, 2016	9	\$ 7.27
Granted	3	8.54
Canceled/Forfeited	(4)	7.31
Vested	(3)	8.30
Non-vested as of December 31, 2017	<u>5</u>	<u>7.43</u>

Total grant-date fair value of awards granted during the during the years ended December 31, 2018 and 2017 was \$0.3 million and \$26 thousand, respectively. Total fair value of awards vested during the years ended December 31, 2018 and 2017 was \$0.4 million and \$17 thousand, respectively.

2018 Employee Stock Purchase Plan

On May 22, 2018, the stockholders of the Company approved the adoption of the DASAN Zhone Solutions, Inc. 2018 Employee Stock Purchase Plan (the “ESPP”). The ESPP replaced the DASAN Zhone Solutions, Inc. 2002 Employee Stock Purchase Plan.

The ESPP authorizes the issuance of up to 250,000 shares of the Company’s common stock. In addition, the ESPP provides for an annual increase on the first day of each calendar year beginning on January 1, 2019, and ending on and including January 1, 2028, equal to the lesser of (i) 1% of the shares outstanding on the last day of the immediately preceding calendar year and (ii) such smaller number of shares as may be determined by the Board of Directors in its sole discretion. Notwithstanding the foregoing, the number of shares of stock that may be issued or transferred pursuant to awards under the ESPP may not exceed an aggregate of 2,000,000 shares. These 2,000,000 shares have been registered pursuant to a registration statement on Form S-8 filed with the SEC on November 8, 2018. The purchase price of the shares will be 85% of the lower of the fair market value of our common stock on (a) the first trading day of the offering period or (b) the final trading day of the offering period, which would be the applicable purchase date.

The Company recorded \$14 thousand of expense related to ESPP for the year ended December 31, 2018.

(10) Net Income (Loss) Per Share

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

	Years ended December 31,		
	2018	2017	2016
Numerator:			
Net income (loss) attributable to DASAN Zhone Solutions, Inc.	\$ 2,767	\$ 1,071	\$ (15,326)
Denominator:			
Weighted average number of shares outstanding:			
Basic (1)	16,482	16,383	11,637
Effect of dilutive securities:			
Stock options, restricted stock units and share awards	264	13	—
Diluted (1)	<u>16,746</u>	<u>16,396</u>	<u>11,637</u>
Net income (loss) per share attributable to DASAN Zhone Solutions Inc.:			
Basic (1)	\$ 0.17	\$ 0.07	\$ (1.32)
Diluted (1)	<u>\$ 0.17</u>	<u>\$ 0.07</u>	<u>\$ (1.32)</u>

(1) Amount presented has been adjusted to reflect the one (1) -for-five (5) reverse stock split effected on February 28, 2017.

The following tables set forth potential common stock that is not included in the diluted net income (loss) per share calculation above because their effect would be anti-dilutive for the periods indicated (in thousands, except exercise price per share data):

	2018	Weighted average option exercise price	2017	Weighted average option exercise price
Outstanding stock options, restricted stock units and unvested restricted shares	1,747	\$ 7.91	1,037	\$ 8.93

As of December 31, 2018, 2017 and 2016, no shares of issued common stock were subject to repurchase.

(11) Income Taxes

The geographical breakdown of income (loss) before income taxes is as follows (in thousands):

	Years ended December 31,		
	2018	2017	2016
Loss before income taxes - Domestic	\$ (3,003)	\$ (8,097)	\$ (10,022)
Income (loss) before income taxes - Foreign	7,563	7,198	(3,819)
Income (Loss) before income taxes	<u>\$ 4,560</u>	<u>\$ (899)</u>	<u>\$ (13,841)</u>

The following is a summary of the components of income tax expense applicable to income (loss) before income taxes (in thousands):

	Years ended December 31,		
	2018	2017	2016
Current:			
Federal	\$ —	\$ (86)	\$ —
State	13	17	(9)
Foreign	1,509	912	88
Total current tax expense	<u>\$ 1,522</u>	<u>\$ 843</u>	<u>\$ 79</u>
Deferred:			
Federal	\$ 12	\$ (12)	\$ —
State	—	—	—
Foreign	190	(2,903)	1,408
Total deferred tax expense (benefit)	<u>\$ 202</u>	<u>\$ (2,915)</u>	<u>\$ 1,408</u>
Total tax expense (benefit)	<u>\$ 1,724</u>	<u>\$ (2,072)</u>	<u>\$ 1,487</u>

A reconciliation of the expected tax expense (benefit) to the actual tax expense is as follows (in thousands):

	Years ended December 31,		
	2018	2017	2016
Expected tax expense (benefit) at statutory rate	\$ 953	\$ (306)	\$ (4,644)
State taxes, net of Federal effect	297	4	(348)
Foreign rate differential	129	(927)	391
Tax impact on US corporate income tax change	—	5,287	—
Valuation allowance	(906)	(4,555)	7,004
Permanent differences	297	234	687
Other permanent items	1,178	—	—
Tax credit carry-forwards	(280)	(1,235)	(896)
Tax on accumulated earnings (from prior year, spin-off effect)	—	—	29
Tax paid to overseas (Not applied to foreign tax credit)	—	—	71
Tax expense adjustments after tax return for prior period	74	(574)	(837)
Foreign currency translation	—	—	124
Others	(18)	—	(94)
Total tax expense	<u>\$ 1,724</u>	<u>\$ (2,072)</u>	<u>\$ 1,487</u>

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting and income tax purposes. Significant components of the Company's deferred tax assets and liabilities as of December 31, 2018 and 2017 are as follows (in thousands):

	As of December 31,	
	2018	2017
Deferred tax assets:		
Net operating loss, capital loss, and tax credit carryforwards	\$ 12,621	\$ 11,945
Reduction of gross deferred tax assets due to built-in loss limitation	—	(678)
Fixed assets and intangible assets	1,451	2,158
Inventory and other reserves	1,998	3,516
Other (mainly accrued expenses)	2,042	2,279
Gross deferred tax assets	18,112	19,220
Less valuation allowance	(15,360)	(16,266)
Total net deferred tax assets	\$ 2,752	\$ 2,954

For the years ended December 31, 2018, 2017 and 2016, the net changes in the valuation allowance were a decrease of \$0.9 million, \$4.6 million, and an increase of \$19.4 million, respectively. The decrease during the current year is mainly due to the decrease of U.S. net deferred tax assets. The decrease during 2017 was mainly due to the release of valuation allowance against the Company's net deferred tax assets in Korea. The Company maintains a valuation allowance on its U.S. net deferred tax assets since it is more likely than not that the net deferred tax assets will not be realized due to the lack of previously paid taxes and anticipated taxable income.

As of December 31, 2018, the Company had net operating loss carryforwards for federal and state income tax purposes of approximately \$29.6 million and \$76.2 million, respectively. The federal losses begin to expire in various years beginning in 2030. The state losses begin to expire in various years beginning in 2019.

Pursuant to Sections 382 and 383 of the Internal Revenue Code, or IRC, annual use of the Company's net operating losses and tax credit carryforwards may be limited in the event a cumulative change in ownership of more than 50% occurs within a three-year period. The Company had an ownership change in September 2016, which has resulted in an annual limitation on the amount of net operating loss and tax credit carry forward which arose prior to that date that the Company can utilize in a future year.

As of December 31, 2018, the Company had research credit carryforwards of approximately \$0.9 million and \$1.3 million for federal and state purposes, respectively. If not utilized, the federal carryforwards will expire beginning in 2036. The California credit carryforwards do not expire and the Georgia credit carryforwards will expire beginning in 2026.

In December 2017, the SEC issued Staff Accounting Bulletin No. 118 ("SAB 118"), which provides guidance on accounting for the income 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 relating to the Tax Act under Accounting Standards Codification Topic 740, "Income Taxes" ("ASC 740"). 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 Tax Act -related income tax effects is incomplete, but the company is able to determine a reasonable estimate, it must record a provisional estimate in its financial statements. If a company cannot determine a provisional estimate to be included in its financial statements, it should continue to apply ASC 740 on the basis of the provisions of the tax laws that were in effect immediately before the enactment of the Tax Act. In accordance with SAB 118, the Tax Act-related income tax effects that the Company initially reported as provisional estimates were refined as additional analysis was performed. The Company has completed its analysis of the Tax Act's income tax effects in the fourth quarter of 2018. There was no material impact to the consolidated financial statements at December 31, 2018.

The Tax Act also requires a U.S. shareholder of a controlled foreign corporation ("CFC") to include in income, as a deemed dividend, the global intangible low-taxed income ("GILTI") of the CFC. This provision is effective for taxable years of foreign corporations beginning after December 31, 2017, and to taxable years of U.S. shareholders in which or with which such taxable years of foreign corporations end. The Company elected to treat taxes due on future U.S. inclusions in taxable income under the GILTI provision as a current period expense when incurred.

Additionally, the Company has made a policy election to apply the incremental cash tax savings approach when analyzing the impact GILTI could have on its U.S. valuation allowance assessment. As a result of future expected GILTI inclusions, and because of the Tax Act's ordering rules, U.S. companies may now expect to utilize tax attribute carryforwards (e.g. net operating losses and foreign tax credits) for which a valuation allowance has historically been recorded (this is referred to as the "tax law ordering approach"). However, due to the mechanics of the GILTI rules, companies that have a GILTI inclusion may realize a reduced (or no) cash tax savings from utilizing such tax attribute carryforwards (this view is referred to as the "incremental cash tax savings approach"). These positions, along with management's analysis of all other available evidence, resulted in the conclusion that the Company maintain the valuation allowance against deferred tax assets in the U.S.

The Company does not intend to distribute the foreign earnings from its foreign subsidiaries and has not recorded any deferred taxes related to such amounts. The Company considers the earnings of certain foreign subsidiaries to be indefinitely reinvested and the determination of any deferred tax liability on this amount is not practicable. The Company's intention has not changed subsequent to the one-time transition tax under the Tax Act.

In accordance with ASC 740 the Company is required to inventory, evaluate, and measure all uncertain tax positions taken or to be taken on tax returns, and to record liabilities for the amount of such positions that may not be sustained, or may only be partially sustained, upon examination by the relevant taxing authorities. At December 31, 2018, the Company had gross unrecognized tax benefits of \$0.8 million, none of which if recognized, would reduce the effective tax rate in a future period, due to the Company's full valuation allowance on U.S. net deferred tax assets.

A reconciliation of the beginning and ending unrecognized tax benefit amounts for 2018, 2017 and 2016 are as follows (in thousands):

	As of December 31,		
	2018	2017	2016
Balance at beginning of the year	\$ 380	\$ 77	\$ —
Increases related to prior year tax positions	—	17	—
Increases related to current year tax positions	427	286	77
Balance at end of the year	<u>\$ 807</u>	<u>\$ 380</u>	<u>\$ 77</u>

It is the Company's policy to account for interest and penalties related to uncertain tax positions as interest expense and general administrative expense, respectively in the consolidated statements of comprehensive income (loss).

The Company did not record any interest and penalty (benefit) expense during the year ended December 31, 2018 and 2017.

The Company or one of its subsidiaries files income tax returns in the U.S. federal jurisdiction, and various state and foreign jurisdictions. The open tax years for the major jurisdictions are as follows:

Federal	2015 - 2018
California and Canada	2014 - 2018
Brazil	2013 - 2018
Germany	2014 - 2018
Japan	2013 - 2018
Korea	2016 - 2018
United Kingdom	2015 - 2018
Vietnam	2016 - 2018

However, due to the fact the Company had net operating losses and credits carried forward in most jurisdictions, certain items attributable to technically closed years are still subject to adjustment by the relevant taxing authority through an adjustment to tax attributes carried forward to open years. The Company is not currently under examination for income taxes in any material jurisdiction.

(12) Non-Controlling Interests

Non-controlling interests were as follows (in thousands):

	As of December 31,	
	2018	2017
Beginning non-controlling interests	534	\$ 416
Net income attributable to non-controlling interests	69	102
Foreign currency translation adjustments (Other Comprehensive Income)	12	16
Ending non-controlling interests	\$ 615	\$ 534

(13) Related Party Transactions

Related Party Acquisitions

On December 31, 2017, DNS (a wholly owned subsidiary of the Company) acquired 100% and 99.99% of the common stock of D-Mobile Limited (“D-Mobile”) and DASAN India Private Limited (“DASAN India”), respectively, from DNI. D-Mobile and DASAN India are resellers of the Company's products in Taiwan and India, respectively. The consideration payable by the Company to DNI for the common stock is the net book value of D-Mobile and DASAN India at December 31, 2017, subject to final adjustments. The net book value of D-Mobile and DASAN India was an aggregate of \$0.8 million. These transactions were accounted for by the Company as common control transactions, with the net assets transferred recorded at historical cost. The transactions did not result in a change in reporting entity and hence were accounted for prospectively.

Related Party Debt

In connection with the Merger, on September 9, 2016, the Company entered into a loan agreement with DNI for a \$5.0 million unsecured subordinated term loan facility. Under the loan agreement, the Company was permitted to request drawdowns of one or more term loans in an aggregate principal amount not to exceed \$5.0 million. As of December 31, 2018, \$5.0 million in term loans was outstanding under the facility. The interest rate as of December 31, 2018 under this facility was 4.6% per annum. On or about February 27, 2019, the entire outstanding balance on this term loan was paid with some of the proceeds of the PNC Facility.

In February 2016, the Company borrowed \$1.8 million from DNI for capital investment, which amount was outstanding as of December 31, 2018. The interest rate as of December 31, 2018 under this facility was 4.6% per annum. On February 27, 2019, the Company amended the terms of this loan to extend the repayment date until 90 days after the maturity of the PNC Facility.

In March 2018, DNS borrowed \$5.8 million from DNI, of which \$4.5 million was repaid on August 8, 2018. As of December 31, 2018, \$1.3 million remained outstanding. The loan bears interest at a rate of 4.6% , and is secured by certain accounts receivable of DNS Korea. On February 27, 2019, the Company amended the terms of this loan to extend the repayment date until 90 days after the maturity of the PNC Facility.

On December 27, 2018, the Company entered into a Loan Agreement with DNI, for a \$6.0 million term loan with an interest rate of 4.6% per annum. On February 27, 2019, the Company amended the terms of the term loan to extend the repayment date until 90 days after the maturity of the PNC Facility and to terminate any security granted to DNI with respect to such term loan.

In June 2017, the Company borrowed \$3.5 million from Solueta, an affiliate of DNI. This loan was repaid in November 2017 and bore interest at a rate of 4.6% per annum, payable monthly.

Interest expense on these related party borrowings was \$0.4 million and \$0.3 million in 2018 and 2017, respectively.

Other Related Party Transactions

Sales and Purchases to and from Related Parties

Sales and purchases, cost of revenue, research and product development, selling, marketing, general and administrative and other income and expenses to and from related parties for the years ended December 31, 2018, 2017 and 2016 were as follows (in thousands):

Counterparty	DNI direct ownership interest	For the year ended December 31, 2018						
		Sales	Cost of revenue	Manufacturing (Cost of revenue)	Research and product development	Selling, marketing, general and administrative	Interest expense	Other Expenses
DNI (Parent Company)	N/A	\$ 4,633	\$ 3,892	—	—	\$ 4,262	\$ 435	\$ 343
Tomato Soft Ltd.	100%	—	—	121	—	—	—	—
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	520	—	—	—
Chasan Networks Co., Ltd.	100%	—	—	1,119	72	—	—	—
Dasan France	100%	203	177	—	—	—	—	—
Handysoft, Inc.	17.63%	794	627	—	—	6	—	—
		<u>\$ 5,630</u>	<u>\$ 4,696</u>	<u>\$ 1,240</u>	<u>\$ 592</u>	<u>\$ 4,268</u>	<u>\$ 435</u>	<u>\$ 343</u>

Counterparty	DNI ownership interest	For the year ended December 31, 2017						
		Sales	Cost of revenue	Manufacturing (Cost of revenue)	Research and product development	Selling, marketing, general and administrative	Other expenses	
DNI (Parent Company)	N/A	\$ 16,558	\$ 14,020	\$ —	\$ —	\$ 4,502	\$ 223	
Tomato Soft Ltd.	100%	—	—	140	246	—	—	
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	448	37	—	
Chasan Networks Co., Ltd.	100%	—	—	810	98	—	—	
D-Mobile	N/A	4,316	2,769	—	—	427	—	
Dasan France	100%	2,168	2,006	—	—	383	—	
Handysoft, Inc.	17.63%	88	24	—	—	6	4	
J-Mobile Corporation	90.47%	8	—	—	—	132	—	
Dasan India Private Limited	N/A	8,244	6,461	—	—	30	—	
Fine Solution	100%	—	—	—	—	4	—	
Solueta	27.21%	—	—	—	—	—	3	
		<u>\$ 31,382</u>	<u>\$ 25,280</u>	<u>\$ 950</u>	<u>\$ 792</u>	<u>\$ 5,521</u>	<u>\$ 230</u>	

(1) As discussed above, on December 31, 2017 DNS acquired DASAN India and D-Mobile from DNI.

Counterparty	DNI Ownership Interest	For the year ended December 31, 2016						
		Sales	Cost of revenue	Manufacturing (Cost of revenue)	Research and product development	Selling, marketing, general and administrative	Other income	Other expenses
DNI (Parent Company)	N/A	\$ 21,214	\$ 18,173	\$ —	\$ —	\$ 5,079	\$ —	\$ 389
Able	61.99%	50	—	—	—	—	—	—
Chasan Networks Co., Ltd.	100%	—	—	720	149	—	—	—
Dasan France	100%	19	18	—	—	—	—	—
Dasan India Private Limited	99.99%	2,710	2,080	—	—	—	—	—
DMC	100%	1	1	—	—	—	—	—
D-Mobile	100%	4,431	3,610	—	—	421	—	—
DTS	81.56%	—	—	—	—	—	1	—
Handysoft, Inc.	17.64%	155	136	—	—	—	—	—
J-Mobile Corporation	68.56%	54	—	—	—	634	25	—
Panda Mobile, Inc.	90%	—	—	—	—	2	—	1
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	750	—	—	—
		<u>\$ 28,634</u>	<u>\$ 24,018</u>	<u>\$ 720</u>	<u>\$ 899</u>	<u>\$ 6,136</u>	<u>\$ 26</u>	<u>\$ 390</u>

The manufacturing (cost of revenue) for the years ended December 31, 2017 and 2016 were reclassified from cost of revenue products and services – related parties to cost of revenue products and services – third parties to conform with the 2018 financial statements presentation.

The Company has entered into sales agreements with DNI and certain of its subsidiaries. Sales and cost of revenue to DNI, DASAN France, DASAN INDIA Private Limited, and D-Mobile represent finished goods produced by the Company that are sold to these related parties who sell the Company's products in Korea, France, India and Taiwan, respectively. As discussed above, on December 31, 2017 DNS acquired DASAN India Private Limited and D-Mobile from DNI.

The Company has entered into an agreement with CHASAN Networks Co., Ltd. to provide manufacturing and research and development services for the Company. Under the agreement with CHASAN Networks., Ltd., the Company is charged a cost plus 7% fee for the manufacturing and development of certain deliverables.

The Company has entered into an agreement with Tomato Soft Ltd., a wholly owned subsidiary of DNI, to provide manufacturing and research and development services for the Company.

The Company has entered into an agreement with Tomato Soft (Xi'an) Ltd. to provide research and development services for the Company. Under the agreement with Tomato Soft (Xi'an) Ltd., the Company is charged an expected annual fee of \$0.8 million for the development of certain deliverables.

Prior to the Merger, as DNS was then a wholly owned subsidiary of DNI, DNI had sales agreements with certain customers on DNS' behalf. Since the Merger, due to these prior sales agreements, the Company has entered into an agreement with DNI in which DNI acts as a sales channel to these customers. Sales to DNI necessary for DNI to fulfill agreements with its customers are recorded net of royalty fees in related party revenue.

The Company shares office space with DNI and certain of DNI's subsidiaries. Prior to the Merger, DNS, then a wholly owned subsidiary of DNI, shared human resources, treasury and other administrative support with DNI. As such, the Company entered into certain service sharing agreements with DNI and certain of its subsidiaries for the shared office space and shared administrative services. Expenses related to rent and administrative services are allocated to the Company based on square footage occupied and headcount, respectively.

Other expenses to related parties represent expenses to DNI for its payment guarantees relating to the Company's borrowings. The Company pays DNI a guarantee fee which is calculated as 0.9% of the guaranteed amount.

Balances of Receivables and Payables with Related Parties

Balances of receivables and payables arising from sales and purchases of goods and services with related parties as of December 31, 2018 and 2017 were as follows (in thousands):

As of December 31, 2018								
Counterparty	DNI Ownership Interest	Account receivables	Other receivables	Deposits for lease*	Loan Payable	Accounts payable	Other payables	Accrued and other liabilities**
DNI (parent company)	N/A	\$ —	\$ —	\$ 735	\$ 14,142	\$ 1,000	\$ 1,231	\$ 169
Tomato Soft Ltd.	100%	—	—	—	—	—	9	—
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	—	—	41	—
Dasan France	100%	280	65	—	—	—	—	—
Handysoft, Inc.	14.77%	303	—	—	—	654	—	—
Chasan Networks Co., Ltd.	100%	—	—	—	—	89	—	—
		<u>\$ 583</u>	<u>\$ 65</u>	<u>\$ 735</u>	<u>\$ 14,142</u>	<u>\$ 1,743</u>	<u>\$ 1,281</u>	<u>\$ 169</u>

As of December 31, 2017								
Counterparty	DNI Ownership Interest	Account receivables	Other receivables	Deposits for lease*	Long - term debt	Accounts payable	Other payables	Accrued and other liabilities**
DNI (parent company)	N/A	\$ 12,576	\$ 93	\$ 786	\$ 6,800	\$ 1,264	\$ 1,859	\$ 59
Tomato Soft Ltd.	100%	—	—	—	—	—	18	—
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	—	—	54	—
Dasan France	100%	870	71	—	—	—	—	—
Handysoft, Inc.	17.63%	52	—	—	—	—	—	—
Chasan Networks Co., Ltd.	100%	—	—	—	—	87	—	—
Solueta	100%	—	—	—	—	—	25	—
		<u>\$ 13,498</u>	<u>\$ 164</u>	<u>\$ 786</u>	<u>\$ 6,800</u>	<u>\$ 1,351</u>	<u>\$ 1,956</u>	<u>\$ 59</u>

* Included in other assets related to deposits for lease in the consolidated balance sheets as of December 31, 2018 and 2017.

** Included in accrued and other liabilities in the consolidated balance sheet as of December 31, 2018 and 2017.

(14) Commitments and Contingencies

Operating Leases

The Company has entered into operating leases for certain office space and equipment, some of which contain renewal options and escalation clauses. Estimated future lease payments under all non-cancellable operating leases with terms in excess of one year, including taxes and service fees, are as follows (in thousands):

	Minimum Future Lease Payments
Year ending December 31:	
2019	\$ 4,100
2020	3,005
2021	2,590
2022	2,664
Thereafter	8,423
Total minimum lease payments	<u>\$ 20,782</u>

Performance Bonds

In the normal course of operations, from time to time, the Company arranges for the issuance of various types of surety bonds, such as bid and performance bonds, which are agreements under which the surety company guarantees that the Company will perform in accordance with contractual or legal obligations. As of December 31, 2018, the Company had \$10.6 million of surety bonds guaranteed by third parties.

Purchase Commitments

The Company has agreements with various contract manufacturers which include non-cancellable inventory purchase commitments. The Company's inventory purchase commitments typically allow for cancellation of orders 30 days in advance of the required inventory availability date as set by the Company at time of order. The amount of non-cancellable purchase commitments outstanding, net of reserve, was \$3.9 million as of December 31, 2018.

Payment Guarantees Provided by Third Parties and DNI

The following table sets forth payment guarantees of the Company's indebtedness and other obligations as of December 31, 2018 that have been provided by third parties and DNI. DNI owns approximately 57.2% of the outstanding shares of our common stock. The amount guaranteed exceeds the principal amounts of outstanding obligations due to collateral requirements by the banks.

Guarantor	Amount Guaranteed (in thousands)	Description of Obligations Guaranteed
DNI	\$ 3,434	Borrowings from Shinhan Bank
DNI	1,717	Purchasing Card from Shinhan Bank
DNI	8,400	Credit facility from Industrial Bank of Korea
DNI	2,147	Purchasing Card from Industrial Bank of Korea
DNI	6,000	Credit facility from NongHyup Bank
DNI	6,145	Borrowings from Export-Import Bank of Korea
DNI	5,366	Borrowings from Korea Development Bank
DNI	8,400	Credit facility from Korea Development Bank
Industrial Bank of Korea	2,850	Letter of credit
Industrial Bank of Korea	2,797	Bank Guarantee
NongHyup Bank	2,633	Letter of credit
Shinhan Bank	153	Purchasing Card
Korea Development Bank	2,599	Letter of credit
Woori Bank	2,664	Performance bonds
Seoul guarantee insurance co.	5,130	Performance payment guarantee*
	<u>\$ 60,435</u>	

* The Company is responsible for the warranty liabilities generally for the period of two (2) years regarding major product sales and have contracted surety insurance to cover part of the warranty liabilities.

Royalties

The Company has certain royalty commitments associated with the shipment and licensing of certain products. Royalty expense is generally based on a dollar amount per unit shipped or a percentage of the underlying revenue and is recorded in cost of revenue.

(15) Litigation

From time to time, the Company is subject to various legal proceedings, claims and litigation arising in the ordinary course of business. While the outcome of these matters is currently not determinable, the Company records an accrual for legal contingencies that it has determined to be probable to the extent that the amount of the loss can be reasonably estimated. The Company does not expect that the ultimate costs to resolve these matters will have a material adverse effect on its consolidated financial position or results of operations. However, litigation is subject to inherent uncertainties, and unfavorable rulings could occur. If an unfavorable ruling were to occur, there exists the possibility of a material adverse impact on the results of operations of the period in which the ruling occurs, or future periods.

(16) Employee Benefit Plans

The Company maintains a 401(k) plan for its employees whereby eligible employees may contribute up to a specified percentage of their earnings, on a pretax basis, subject to the maximum amount permitted by the Internal Revenue Code. Under the 401(k) plan, the Company may make discretionary contributions. The 401(k) plan is a Legacy Zhone plan. The Company made no discretionary contributions to the plan in 2018 or 2017.

The Company also maintains a defined contribution plan for its employees in Korea. Under the defined contribution plan, the Company contributes 8.33% of an employee's gross salary into the plan.

(17) Enterprise-Wide Information

The Company is a global provider of ultra-broadband network access solutions and communications platforms deployed by advanced Tier 1, 2 and 3 service providers and enterprise customers. 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 consolidated basis accompanied by disaggregated information about revenues by geographic region for purposes of making operating decisions and assessing financial performance. The Company attributes revenue from customers to individual countries based on location shipped. The following summarizes required disclosures about geographical concentrations and revenue by products and services (in thousands):

	Years ended December 31,		
	2018	2017	2016
Revenue by geography:			
United States	\$ 50,795	\$ 48,840	\$ 16,872
Canada	4,413	5,631	1,967
Total North America	55,208	54,471	18,839
Latin America	27,596	26,206	9,604
Europe, Middle East, Africa	34,741	30,768	13,611
Korea	76,006	81,533	77,979
Other Asia Pacific	88,797	54,136	30,271
Total International	227,140	192,643	131,465
Total	\$ 282,348	\$ 247,114	\$ 150,304

	Years ended December 31,		
	2018	2017	2016
Revenue by products and services:			
Products	\$ 269,269	\$ 235,117	\$ 142,238
Services	13,079	11,997	8,066
Total	\$ 282,348	\$ 247,114	\$ 150,304

The Company's property, plant and equipment, net of accumulated depreciation, were located in the following geographical areas as of December 31, 2018 and 2017 (in thousands):

	As of December 31,	
	2018	2017
United States	\$ 3,036	\$ 3,393
Korea	1,543	1,633
Japan and Vietnam	910	810
Taiwan and India	29	37
	\$ 5,518	\$ 5,873

(18) Subsequent Events

Acquisition of Keymile

On January 3, 2019, ZTI Merger Subsidiary III Inc., a Delaware corporation and our wholly owned subsidiary, acquired all of the outstanding shares of Keymile GmbH, a limited liability company organized under the laws of Germany (“Keymile”) from Riverside KM Beteiligung GmbH, a limited liability company organized under the laws of Germany, pursuant to a share purchase agreement (the “Keymile Acquisition”). The aggregate cash purchase price paid for all of the shares of Keymile and certain of its subsidiaries, was EUR 10,250,000 (\$11.8 million), which was paid with a combination of cash, a loan from DNI, and a draw under our Wells Fargo credit facility. The Company also assumed liabilities of approximately \$18.0 million, including pension liability amounting to \$16.2 million. Following the closing of the Keymile Acquisition, Keymile became the Company’s wholly-owned subsidiary.

Keymile is a leading solution provider and manufacturer of telecommunication systems for broadband access. The Company believes Keymile strengthens its portfolio of broadband access solutions, which now includes a series of multi-service access platforms for FTTx network architectures, including ultra-fast broadband copper access based on VDSL/Vectoring & G. Fast technology.

The acquisition will be accounted for as a business combination in accordance with the authoritative guidance. Due to the closing of this acquisition subsequent to the period end, the Company is currently determining the fair value of assets acquired and liabilities assumed necessary to develop the purchase price allocation. Therefore, disclosure of the purchase price allocation to the tangible and intangible assets acquired and liabilities assumed is not practicable.

PNC Debt Facility

On February 27, 2019, the Company and ZTI Merger Subsidiary III, Inc., a wholly-owned subsidiary of the Company (“ZTI”, and together with the Company, the “Borrowers”), and certain direct and indirect subsidiaries of the Borrowers, as guarantors, entered into that certain Revolving Credit, Term Loan, Guaranty and Security Agreement (the “Domestic Credit Agreement”) and that certain Export-Import Revolving Credit, Guaranty and Security Agreement (the “Ex-Im Credit Agreement,” and together with the Domestic Credit Agreement, the “Credit Agreements”), in each case with PNC Bank, National Association (“PNC Bank”) and Citibank, N.A. as the lenders, and PNC as agent for the lenders.

The Credit Agreements provide for a \$25 million term loan and a \$15 million revolving line of credit (including subfacilities for Ex-Im transactions, letters of credit and swing loans) with a \$10 million incremental increase option. The amount the Company is able to borrow on the revolving line of credit at any time is based on eligible accounts receivable and other conditions, less certain reserves. Borrowings under the Credit Agreements bear interest at a floating rate equal to either the PNC prime rate or the LIBOR rate for the applicable period, plus a margin that is based on the type of advance.

The Company used a portion of the funds borrowed from the term loan under the Credit Agreements to (i) repay \$5.0 million existing related party indebtedness with DNI plus accrued interest, (ii) repay \$1.5 million revolving line of credit outstanding balance plus accrued interest and fees and cash collateralized \$3.6 million outstanding letter of credit under the Wells Fargo Credit Facility, and (iii) repay \$5.6 million short-term debt in Korea and Japan. The Company will use the remaining funds for ongoing working capital needs.

The Company’s obligations under the Credit Agreements are secured by substantially all of the personal property assets of the Borrowers and the subsidiaries that guarantee the Credit Agreements, including their intellectual property

The maturity date under the Credit Agreements is February 27, 2022, which reflects a three-year term. Repayment of the term loan shall in be in eight quarterly installments of \$625,000 beginning June 30, 2019, followed by quarterly installments of \$937,500 beginning on June 30, 2021, with all remaining unpaid principal and accrued interest due on the maturity date. Repayment of the revolving line of credit shall be due and payable on the maturity date.

The Credit Agreements contain certain covenants, limitations, and conditions with respect to the Company, including a maximum leverage ratio, a minimum fixed charge coverage ratio, and a minimum liquidity covenant, as well as financial reporting obligations, and usual and customary events of default. If an event of default occurs, the Agent and Lenders will be entitled to take various actions, including requiring the immediate repayment of all outstanding amounts under the Credit Agreements, terminating commitments to make additional advances and selling the assets of the Borrowers and their subsidiary guarantors to satisfy the obligations under the Credit Agreements.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures designed to provide reasonable assurance that information required to be disclosed in our reports filed or submitted pursuant to the Securities Exchange Act of 1934 (the “Exchange Act”) is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate to allow for timely decisions regarding required disclosures. In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and management applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

As required by Rule 13a-15(b) of the Exchange Act, we conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2018, the end of the period covered by this Annual Report on Form 10-K. Our management, including our Chief Executive Officer and our Chief Financial Officer, supervised and participated in the evaluation. They concluded that our disclosure controls and procedures were not effective as of December 31, 2018 because of the material weaknesses in our internal control over financial reporting described below under “Management’s Annual Report on Internal Control over Financial Reporting.”

Management’s Annual Report on Internal Control over Financial Reporting

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 generally accepted accounting principles. Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2018, the end of the period covered by this Annual Report on Form 10-K. In making this assessment, management used the criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee Sponsoring Organizations of the Treadway Commission. Management concluded that, as of December 31, 2018, our internal control over financial reporting was not effective, because of the unremediated material weaknesses in our internal control over financial reporting described below.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of the registrant’s annual or interim financial statements will not be prevented or detected on a timely basis. Based on the results of the independent investigation and due to the incorrect application of generally accepted accounting principles that resulted in material misstatements and a restatement of our unaudited condensed consolidated financial statements for the three and nine months ended September 30, 2016, management identified material weaknesses in our internal control over financial reporting as of December 31, 2016 which continue to exist at December 31, 2018. Specifically, we did not maintain an effective control environment as there was an insufficient complement of personnel with appropriate accounting knowledge, experience and competence, resulting in incorrect application of generally accepted accounting principles. This material weakness contributed to the following material weaknesses. We did not maintain effective controls over our financial close process. Also, we did not design and maintain effective controls over the review of supporting information to determine the completeness and accuracy of the accounting for complex transactions, specifically related to the business combination that occurred on September 9, 2016, which resulted in an incorrect application of generally accepted accounting principles that resulted in material misstatements and a restatement of our unaudited condensed consolidated financial statements for the three and nine months period ended September 30, 2016. Additionally, these material weaknesses could result in a misstatement in the financial statements that would result in a material misstatement in the annual or interim consolidated financial statements that would not be prevented or detected.

Remediation Plan for Material Weaknesses in Internal Control over Financial Reporting

As of the date of this Annual Report on Form 10-K, we are re-assessing the design of our controls and modifying processes related to the accounting for significant and unusual transactions as well as enhancing monitoring and oversight controls in the application of accounting guidance related to such transactions. In connection therewith, we have hired and we anticipate that we will hire additional accounting personnel with relevant skills, training and experience, and conduct further training of our accounting and finance personnel.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting that occurred during the fourth quarter of our latest fiscal year that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. Merger and acquisition-related integration activities of Keymile may lead us to modify certain internal controls in future periods.

Inherent Limitations on Effectiveness of Controls

Our management, including our Chief Executive Officer and Chief Financial Officer, does not expect that our disclosure controls and procedures or 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. The design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Further, 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 the Company have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty and that breakdowns can occur because of simple error or mistake. Controls can also be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the controls. The design of any system of controls is based in part on certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions. Projections of any evaluation of controls effectiveness to future periods are subject to risks. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with policies or procedures.

ITEM 9B. OTHER INFORMATION

Given the timing of the following events, the following information is included in this Annual Report on Form 10-K pursuant to Item 5.02 of Form 8-K, "Departure of Directors or Certain Officers; Election of Directors; Appointment of Certain Officers; Compensation Arrangements of Certain Officers" in lieu of filing a Form 8-K.

(b) Departure of Director

On March 6, 2019, Mr. Sung-Bin Park notified the Company of his decision to resign from our Board of Directors effective as of March 31, 2019. Consequently, Mr. Park will not stand for re-election to the Board of Directors at our 2019 Annual Meeting of Stockholders. Mr. Park's decision to resign did not result from any disagreement with the Company on any matter relating to its operations, policies or practices.

Mr. Park has served as a director of the Company since September 2016. Mr. Park is a Class II director whose term will otherwise expire at our 2019 Annual Meeting of Stockholders. He is a member of the Audit Committee, the Compensation Committee and the Corporate Governance and Nominating Committee of the Board of Directors.

The Board of Directors does not intend to fill the vacancy on the Board of Directors created by Mr. Park's resignation at this time, but may nominate a replacement for election in the future.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required in this item relating to our corporate governance, directors and nominees, and the compliance with Section 16(a) of the Securities Exchange Act of 1934 is incorporated herein by reference to the sections of our definitive proxy statement for our 2019 Annual Meeting of Stockholders to be filed with SEC within 120 days of the end of our fiscal year (the “Proxy Statement”) entitled “Corporate Governance Principles and Board Matters,” “Ownership of Securities” and “Proposal 1: Election of Directors.” Since our last Annual Report on Form 10-K, we have not made any material changes to the procedures by which our stockholders may recommend nominees to the Board of Directors.

Information relating to our executive officers is included under the caption “Executive Officers of the Registrant” in Part I of this Annual Report on Form 10-K, pursuant to General Instruction G(3) of Form 10-K.

We have adopted a Code of Conduct and Ethics applicable to all of our employees, directors and officers (including our principal executive officer, principal financial officer, principal accounting officer and controller). The Code of Conduct and Ethics is designed to deter wrongdoing and to promote honest and ethical conduct and compliance with applicable laws and regulations. The full text of our Code of Conduct and Ethics is published on our website at <https://dasanzhone.com/about/investor-relations/corporate-governance>. We intend to disclose any future amendments to certain provisions of our Code of Conduct and Ethics, or waivers of such provisions granted to executive officers and directors, on our website within four business days following the date of such amendment or waiver.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated herein by reference to the sections of the Proxy Statement entitled “Executive Compensation” and “Director Compensation.”

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

The information required by this item relating to security ownership of certain beneficial owners and management, and securities authorized for issuance under equity compensation plans is incorporated herein by reference to the sections of the Proxy Statement entitled “Ownership of Securities” and “Executive Compensation.”

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated herein by reference to the section of the Proxy Statement entitled “Certain Relationships and Related Transactions.”

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item is incorporated herein by reference to the section of the Proxy Statement entitled “Proposal 2: Ratification of Appointment of Independent Registered Public Accounting Firm.”

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

1. Financial Statements

The Index to Consolidated Financial Statements on page 37 is incorporated herein by reference as the list of financial statements required as part of this Annual Report on Form 10-K.

2. Exhibits

The exhibits required to be filed by Item 601 of Regulation S-K are listed in the “Index to Exhibits” immediately preceding the exhibits hereto and such listing is incorporated herein by reference.

ITEM 16. FORM 10-K SUMMARY

None.

INDEX TO EXHIBITS

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
3.1	Restated Certificate of Incorporation of DASAN Zhone Solutions, Inc., as amended through February 28, 2017	10-K	3.1	September 9, 2017	
3.2	Amended and Restated Bylaws	8-K	3.2	September 12, 2016	
10.1#	DASAN Zhone Solutions, Inc. 2017 Incentive Award Plan	8-K	10.1	January 10, 2017	
10.1.1#	Amendment to DASAN Zhone Solutions, Inc. 2017 Incentive Award Plan				X
10.1.2#	Form of Stock Option Agreement for the DASAN Zhone Solutions, Inc. 2017 Incentive Award Plan	8-K	10.2	January 10, 2017	
10.1.3#	Form of Restricted Stock Unit Award Agreement for the DASAN Zhone Solutions, Inc. 2017 Incentive Award Plan	10-K	10-1	September 9, 2017	
10.2#	DASAN Zhone Solutions, Inc. Amended and Restated 2001 Stock Incentive Plan, as amended	8-K	10.6	September 13, 2016	
10.2.1#	Form of Stock Option Agreement for the DASAN Zhone Solutions, Inc. Amended and Restated 2001 Stock Incentive Plan, as amended	8-K	10.7	September 13, 2016	
10.2.2#	Form of Restricted Stock Award Agreement for the DASAN Zhone Solutions, Inc. Amended and Restated 2001 Stock Incentive Plan, as amended	8-K	10.2	May 17, 2007	
10.2.3#	Form of Restricted Stock Unit Award Agreement for the DASAN Zhone Solutions, Inc. Amended and Restated 2001 Stock Incentive Plan, as amended	10-Q	10.3	November 14, 2016	
10.3#	DASAN Zhone Solutions, Inc. 2018 Employee Stock Purchase Plan	S-8	10.1	November 8, 2018	
10.3#	DASAN Zhone Solutions, Inc. 2002 Employee Stock Purchase Plan	8-K	10.1	May 17, 2006	
10.4#	DASAN Zhone Solutions, Inc. Non-Employee Director Compensation Program	10-K	10.4	April, 4, 2018	
10.5#	Form of Indemnity Agreement (directors and officers)	10-Q	10.20	May 14, 2004	
10.6#	Form of Change of Control Severance Agreement	10-Q	10.1	August 9, 2012	
10.7#	Zhone Technologies, Inc. Incentive Bonus Plan	10-Q	10.1	November 8, 2013	
10.8#	Amended and Restated Employment Agreement dated as of October 10, 2017 by and between DASAN Zhone Solutions, Inc. and Il Yung Kim	10-K	10.4	April 4, 2018	
10.9#	Employment Agreement, dated as of December 1, 2017, by and between DASAN Zhone Solutions, Inc. and Michael Golomb	10-K	10.9	April 4, 2018	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
10.10#	Amended and Restated Employment Agreement, dated as of September 9, 2016, by and between Dasan Zhone Solutions, Inc. and James Norrod	8-K	10.2	September 13, 2016	
10.11#	General Release of Claims, dated as of September 11, 2017, by and between Dasan Zhone Solutions, Inc. and James Norrod	10-Q	10.2	November 15, 2017	
10.12#	Employment Agreement dated as of September 9, 2016 by and between Dasan Zhone Solutions, Inc. and Kirk Misaka	8-K	10.3	September 13, 2016	
10.13	General Release of Claims dated as of September 11, 2017 by and between Dasan Zhone Solutions, Inc. and Kirk Misaka	10-Q	10.3	November 15, 2017	
10.14#	Transaction Bonus Agreement, dated as of September 9, 2016, by and between DASAN Zhone Solutions, Inc. and James Norrod	8-K	10.4	September 13, 2016	
10.15#	Transaction Bonus Agreement, dated as of September 9, 2016, by and between DASAN Zhone Solutions, Inc. and Kirk Misaka	8-K	10.5	September 13, 2016	
10.16#	Letter Agreement, dated November 10, 2016, between DASAN Zhone Solutions, Inc. and Eric Presworsky	8-K	10.1	November 14, 2016	
10.17#	Stock Option Cancellation Agreement dated March 31, 2016, between Zhone Technologies, Inc. and James Norrod	8-K	10.1	April 5, 2016	
10.18	Stockholder Agreement, dated as of September 9, 2016, by and among DASAN Zhone Solutions, Inc. and DASAN Networks, Inc. and the other parties thereto	8-K	10.1	September 12, 2016	
10.19	Lock-Up Agreement, dated as of September 9, 2016, by and among DASAN Zhone Solutions, Inc., DASAN Networks, Inc. and the other parties thereto	8-K	10.2	September 12, 2016	
10.20	Registration Rights Agreement, dated as of September 9, 2016, by and among DASAN Zhone Solutions, Inc., DASAN Networks, Inc. and the other parties thereto	8-K	10.3	September 12, 2016	
10.21	Loan Agreement, dated as of September 9, 2016, by and among DASAN Zhone Solutions, Inc., DASAN Networks, Inc. and the other parties thereto	8-K	10.4	September 12, 2016	
10.22	Credit and Security Agreement, dated as of March 13, 2012, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	10-K	10.16	March 15, 2012	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
10.22.1	First Amendment to Credit and Security Agreements, dated as of March 12, 2013, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	10-K	10.12.1	March 15, 2013	
10.22.2	Second Amendment to Credit and Security Agreements, dated as of September 30, 2013, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	8-K	10.1	October 1, 2013	
10.22.3	Third Amendment to Credit and Security Agreements, dated as of March 5, 2014, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	10-K	10.13.3	March 5, 2014	
10.22.4	Fourth Amendment to Credit and Security Agreements, dated as of March 6, 2015, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	10-K	10.14.4	March 6, 2015	
10.22.5	Fifth Amendment to Credit and Security Agreements, dated as of March 23, 2016, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	10-K	10.14.5	March 23, 2016	
10.22.6	Sixth Amendment to Credit and Security Agreements and Consent, dated as of September 9, 2016, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	8-K	10.5	September 12, 2016	
10.22.7	Joinder and Seventh Amendment to Credit and Security Agreements, dated as of October 7, 2016, by and among DASAN Zhone Solutions, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation, Dasan Network Solutions, Inc. and Wells Fargo Bank, National Association	10-Q	10.15	November 14, 2016	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
10.22.8	Eighth Amendment to Credit and Security Agreements, dated as of March 19, 2018, by and among DASAN Zhone Solutions, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation, Dasan Network Solutions, Inc. and Wells Fargo	10-K	10.22.8	April 4, 2018	
10.22.9	Consent Memorandum, dated May 5, 2017, by and among DASAN Zhone Solutions, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation, Dasan Network Solutions, Inc. and Wells Fargo	8-K	10.1	May 9, 2017	
10.22.10	Ninth Amendment to Credit and Security Agreements, dated as of March 30, 2018, by and among DASAN Zhone Solutions, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation, Dasan Network Solutions, Inc. and Wells Fargo	8-K	10.2	April 2, 2018	
10.22.11	Letter Agreement, dated July 3, 2017, by and among DASAN Zhone Solutions, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation, Dasan Network Solutions, Inc. and Wells Fargo	8-K	10.1	July 6, 2017	
10.22.12	Letter Agreement, dated March 27, 2018, by and among DASAN Zhone Solutions, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation, Dasan Network Solutions, Inc. and Wells Fargo	10-K	10.22.12	April 4, 2018	
10.23	Credit and Security Agreement (Ex-Im Subfacility), dated as of March 13, 2012, by and among Zhone Technologies, Inc., ZTI Merger Subsidiary III, Inc., Premisys Communications, Inc., Zhone Technologies International, Inc., Paradyne Networks, Inc., Paradyne Corporation and Wells Fargo Bank, National Association	10-K	10.17	March 15, 2012	
10.24	Office Lease Agreement, dated February 18, 2016, between Zhone Technologies, Inc. and BACM 2005-3 Bryan Dairy Industrial, LLC	8-K	10.1	February 23, 2016	
10.24.1	First Amendment to Office Lease Agreement, dated June 7, 2016, between Zhone Technologies, Inc. and BACM 2005-3 Bryan Dairy Industrial, LLC	10-Q	10.1	August 9, 2016	
10.25	Loan Agreement, dated as of March 27, 2018, by and between DASAN Networks, Inc. and DASAN Network Solutions, Inc.	8-K	10.1	April 2, 2018	
21.2	List of Subsidiaries				X
23.1	Consent of Independent Registered Public Accounting Firm				X

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
31.1	Certification of Chief Executive Officer Pursuant to Rule 13a-14(a)/15d-14(a)				X
31.2	Certification of Chief Financial Officer Pursuant to Rule 13a-14(a)/15d-14(a)				X
32.1	Section 1350 Certification of Chief Executive Officer and Chief Financial Officer				X
101.INS	XBRL Instance Document				X
101.SCH	XBRL Taxonomy Extension Schema				X
101.CAL	XBRL Taxonomy Extension Calculation Linkbase				X
101.DEF	XBRL Taxonomy Extension Definition Linkbase				X
101.LAB	XBRL Taxonomy Extension Labels Linkbase				X
101.PRE	XBRL Taxonomy Extension Presentation Linkbase				X

Management contract or compensatory plan or arrangement in which one or more executive officers or directors participates.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

DASAN ZHONG SOLUTIONS, INC.

Date: March 12, 2019

By: /s/ IL YUNG KIM
Il Yung Kim
President, Chief Executive Officer and Director

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

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ IL YUNG KIM</u> Il Yung Kim	President, Chief Executive Officer (Principal Executive Officer)	March 12, 2019
<u>/s/ MICHAEL GOLOMB</u> Michael Golomb	Chief Financial Officer, Corporate (Principal Financial and Accounting), Corporate Treasurer, and Secretary	March 12, 2019
<u>/s/ MIN WOO NAM</u> Min Woo Nam	Chairman of the Board of Directors	March 12, 2019
<u>/s/ MICHAEL CONNORS</u> Michael Connors	Director	March 12, 2019
<u>/s/ SEONG GYUN KIM</u> Seong Gyun Kim	Director	March 12, 2019
<u>/s/ SUNG-BIN PARK</u> Sung-Bin Park	Director	March 12, 2019
<u>/s/ DAVID SCHOPP</u> David Schopp	Director	March 12, 2019
<u>/s/ ROLF UNTERBERGER</u> Rolf Unterberger	Director	March 12, 2019

**AMENDMENT TO
DASAN ZHONE SOLUTIONS, INC.
2017 INCENTIVE AWARD PLAN**

THIS AMENDMENT (this “*Amendment*”) to the DASAN Zhone Solutions, Inc. 2017 Incentive Award Plan (the “Plan”), is made and adopted by the Board of Directors (the “Board”) of DASAN Zhone Solutions, Inc., a Delaware corporation (the “Corporation”), effective as of the date approved by the Corporation’s stockholders (the “Effective Date”). All capitalized terms used but not otherwise defined herein shall have the respective meanings ascribed to such terms in the Plan (as defined below).

RECITALS

WHEREAS, the Corporation maintains the Plan;

WHEREAS, pursuant to Section 12.1(a) of the Plan, the Plan may be wholly or partially amended or otherwise modified, suspended or terminated at any time or from time to time by the Board; and

WHEREAS, the Board believes it is in the best interests of the Corporation and its stockholders to amend the Plan to, among other things, increase the total number of shares of common stock of the Corporation (the “Shares”) that may be issued under the Plan by 574,359 Shares, as set forth herein.

NOW THEREFORE, BE IT RESOLVED: that the Plan is hereby amended as follows, effective as of the Effective Date:

AMENDMENT

1. Section 2.39 of the Plan is hereby deleted and replaced in its entirety with the following:

“Performance-Based Compensation” shall mean any compensation that is intended to qualify as “performance-based compensation” as described in Section 162(m)(4)(C) of the Code prior to its repeal.

2. The lead-in phrase of Section 2.41(a) of the Plan is hereby deleted and replaced in its entirety with the following:

“The Performance Criteria that may be used to establish Performance Goals may include, but are not limited to, the following:”

3. Section 3.1(a) of the Plan is hereby deleted and replaced in its entirety with the following:

“Subject to Sections 3.1(b) and 12.2 hereof, the aggregate number of Shares which may be issued or transferred pursuant to Awards under the Plan is the sum of: (i) 1,174,359 Shares; plus (ii) any Shares subject to Prior Plan Awards to the extent such Shares become available for issuance under this Plan pursuant to Section 3.1(b) below (including Shares subject to Prior Plan Awards that become available for issuance under this Plan pursuant to Section 3.1(b) below following the expiration of the term of the Prior Plan) (provided, that if such Shares would otherwise become available for issuance under this Plan pursuant to Section 3.1(b) below prior to the expiration of the term of the Prior Plan but become subject to a Prior Plan Award granted following the Effective Date (a “New Prior Plan Award”), such Shares shall not become available for issuance under this clause (ii) unless and until such Shares become available for issuance under this Plan pursuant to Section 3.1(b) below with respect to such New Prior Plan Award); plus (iii) an annual increase on the first day of each calendar year beginning on January 1, 2018 and ending on and including January 1, 2027, equal to the least of (A) four percent (4%) of the Shares outstanding on the last day of the immediately preceding calendar year and (B) such smaller number of Shares as may be determined by the Board in its sole discretion; provided, however, that the maximum number of Shares that may become available for issuance pursuant to Awards under the Plan shall be 8,000,000 Shares, subject to adjustment pursuant to Section 12.2 hereof (the “Share Limit”). In order that the applicable regulations under the Code relating to Incentive Stock Options be satisfied, the maximum number of Shares that may be issued under the Plan upon the exercise of Incentive Stock Options shall be 8,000,000 Shares.”

4. Notwithstanding any other provision of the Plan or any Award, each Award intended to qualify as Performance-Based Compensation shall be subject to any additional limitations as the Committee determines necessary for such Award to qualify as “performance-based compensation” as described in Section 162(m)(4)(C) of the Code prior to its repeal pursuant to the transition relief rules in the Tax Cuts and Jobs Act of 2017, and to the extent any of the provisions of the Plan or any Award (or any amendments hereto pursuant to this amendment to the Plan) would cause any such Awards to fail to so qualify, any such provisions shall not apply to such Awards to the extent necessary to ensure the continued qualification or exemption of such Awards. To the extent permitted by Applicable Law, the Plan and any such Awards shall be deemed amended to the extent necessary to conform to such requirements.
5. This Amendment shall be and is hereby incorporated into and forms a part of the Plan.
6. Except as expressly provided herein, all terms and conditions of the Plan shall remain in full force and effect.

I hereby certify that the foregoing Amendment was duly adopted by the Board of Directors of DASAN Zhong Solutions, Inc. on February 12, 2018.

Executed on this 12th day of February, 2018.

/s/ Michael Golomb

Michael Golomb

Secretary

DASAN Zhone Solutions, Inc.

List of Subsidiaries

DASAN Zhone Solutions, Inc. had the following subsidiaries at December 31, 2018:

<u>Name</u>	<u>Organized under the laws of</u>
Ark Electronic Products, Inc.	Florida
Astarte Fiber Networks, Inc.	Colorado
DASAN Network Solutions, Inc.	United States
DASAN Network Solutions, Inc. (Korea)	Korea
DASAN India Private Limited	India
DASAN Network Solutions, Japan Co., Ltd. (Formerly: HandySoft Japan Co., Ltd.)	Japan
DASAN Vietnam Co., Ltd.	Vietnam
D-Mobile Limited	Taiwan
Paradyne Corporation	Delaware
Paradyne Finance Corp.	Delaware
Paradyne Worldwide Corporation	Delaware
Premisys Communications, Inc.	Delaware
Premisys Communications Ltd.	United Kingdom
Xybridge Technologies, Inc.	Texas
Zhone AB	Sweden
Zhone International Ltd.	Cayman Islands
Zhone Technologies B.V.	Netherlands
Zhone Technologies Campus, LLC	California
Zhone Technologies De Argentina SRL	Argentina
Zhone Technologies de Colombia Limitada	Colombia
Zhone Technologies do Brasil LTDA	Brazil
Zhone Technologies GMBH	Germany
Zhone Technologies, Inc.	Canada
Zhone Technologies International, Inc.	Delaware
Zhone Technologies Limited	Hong Kong
Zhone Technologies Ltd.	United Kingdom
Zhone Technologies Pte. Ltd.	Singapore
Zhone Technologies S. de R.L. de C.V.	Mexico
Zhone Technologies S.R.L.	Italy
ZTI Merger Subsidiary III, Inc.	Delaware
Zhone Technologies, SA (PTY) LTD	South Africa

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-228276, 333-221568, 333-202580, 333-194334, 333-180148, 333-172876, 333-165510, 333-158009, 333-155321, 333-149598, 333-141153, 333-134217, 333-132336, 333-123369, 333-88732, 333-83422, 333-73352, and 333-61956) of DASAN Zhone Solutions, Inc. of our report dated March 12, 2019 relating to the consolidated financial statements, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

San Jose, California

March 12, 2019

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO
RULE 13a-14(a)/15d-14(a)**

I, Il Yung Kim, certify that:

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

Date: March 12, 2019

/s/ IL YUNG KIM

Il Yung Kim
President, Chief Executive Officer

**CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO
RULE 13a-14(a)/15d-14(a)**

I, Michael Golomb, certify that:

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

Date: March 12, 2019

/s/ MICHAEL GOLOMB

Michael Golomb

Chief Financial Officer, Corporate Treasurer and Secretary

SECTION 1350 CERTIFICATION

Pursuant to 18 U.S.C. Section 1350, Il Yung Kim, President and Chief Executive Officer of DASAN Zhone Solutions, Inc. (the "Company"), and Michael Golomb, Chief Financial Officer, Treasurer and Corporate Secretary, of the Company, each hereby certify that, to their knowledge:

1. The Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2018 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 12, 2019

/s/ IL YUNG KIM

Il Yung Kim

President, Chief Executive Officer

/s/ MICHAEL GOLOMB

Michael Golomb

Chief Financial Officer, Corporate Treasurer and Secretary