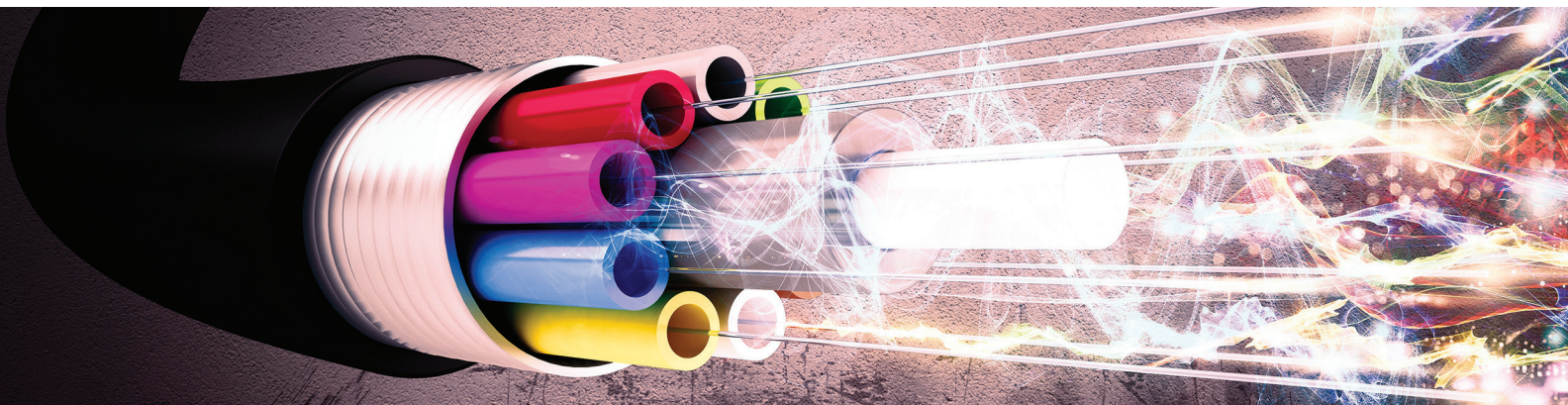




2020 Annual Report



Enabling the
Hyper-Connected World





To our Shareholders:

2020 was a year that will forever change the world. While the pandemic was devastating from the standpoint of health and public safety, it also became a transformational catalyst for the way people live, work, communicate, access news and entertainment, and fundamentally changed how companies operate. I am proud of the way that DZS employees around the globe responded to the pandemic-inspired challenges of 2020, demonstrating an unwavering commitment to our customer-first philosophy, overcoming countless challenges and consistently exceeding our expectations. During this time, we created a safe environment for our employees working in our manufacturing facilities as “essential workers” and worked closely with our teams around the world to balance safety, telecommuting requirements, and productivity. We are thrilled to see the promise of a return to normalcy now in 2021 and appreciate that for all of the pandemic-imposed hardships that DZS and its employees had to endure over the last year, they have left us as a company more prepared, resilient and focused on a OneDZS culture.

I am pleased to report that since joining DZS in 2020, the company has undergone an extraordinary transformation and achieved some outstanding results. Pervasive leadership and management enhancements paved the way for a global integration, a top-to-bottom re-branding, record sales and financial performance, a \$64 million equity raise, two technology acquisitions, product and IT systems rationalization, and numerous next generation product launches. The scope and scale of these changes has been impressive, and is a testament to the experience, knowledge, commitment and culture the new management team has brought to DZS and the support of a luminary board of directors that has provided best practice governance.

DZS is in the early innings of implementing its digitalization playbook, which is designed to capitalize on a global market that increasingly requires more bandwidth, faster data rates, agility, mobility, intelligence and software automation. Our vision and strategy leverage our core strengths in broadband access, mobile transport and in connected home/business solutions. Furthermore, we believe our expansion into adjacent markets and technologies such as fixed wireless access, software defined networking (SDN) and network function virtualization (NFV) is positioning the company for growth opportunities in the future. In the meantime, our innovative technology and product differentiation, trusted relationships, global services and disruptive strategy are delivering results in the form of new design wins and customers, new channel partners and an expansive technology alliance ecosystem.

As one of the premier access networking and cloud-native orchestration and software automation companies serving the wireline, wireless and enterprise markets, DZS is poised and prepared to participate in the digital transformation that is fueled by 5G and fiber-based broadband services.



2020 Performance Highlights

People

DZS extensively reshaped its executive leadership team and global employee base across research & development (R&D), product line management (PLM), sales, marketing, supply chain, finance, and IT. We prioritized and accelerated R&D activities associated with our mobile transport, fixed broadband and connected premises portfolios, and completed a thorough rationalization of our people, products, operations, and IT systems.

Marquee Customer Growth

We enhanced our customer base in 2020, which at the close of the year comprised 10 of the top 25 wireline and wireless telecommunications service providers in the world. Additionally, six of the top 20 mobile service providers were deploying DZS mobile transport solutions at the end of the year. Tier I wireless and wireline broadband communications service providers represented 58% of our Q4 revenue in 2020.

Financial Results

While the first half of 2020 was adversely impacted by the pandemic, the last two quarters of the year represented the best two consecutive revenue quarters in the company's history, with a 22% revenue increase compared to the same period in 2019. In the third quarter of 2020, the company achieved its highest-ever revenue quarter. The emergence of 5G continued to fuel growth across our mobile transport portfolio, with xHaul revenues surging in the second half to represent 31% of revenue in Q4 2020. For the full year, revenue from our mobile transport portfolio increased approximately 150% to represent 26% of total revenue.

Our cash (including cash equivalents and restricted cash) increased by over \$20 million in 2020, driven by a strong fourth quarter cash flow where cash increased by \$14.0 million despite the paydown of \$8.0 million of debt. Our cash position benefited from improvements in working capital management, with inventory turns improving throughout 2020 to 5.6 times in the fourth quarter. DSOs also were maintained at significantly lower levels by the end of 2020 relative to the first half of 2020 and compared to 2019. Due to these factors, we improved our net cash position from a net debt of \$3.1 million at the end of 2019 to a net cash position of \$10.9 million at the end of 2020.

Products and Margins

In Q4 2020, DZS commenced technology, operations, sales, and financial workstreams to capture cost synergies and margin expansion. These workstreams specifically related to new product introductions and roadmap alignment with market trends, customer requirements, supply chain and manufacturing optimization, tariff mitigation, and new service attachment programs. Significant progress was achieved, and we expect 2021 to be an inflection point where we expect to realize the benefits of many of the cost savings and margin expansion workstreams that are underway by the end of the year.



Operations and Supply Chain

Our supply chain was challenged in 2020, with pandemic related lockdowns causing labor shortages that impacted worldwide manufacturing capacity and disrupted global freight patterns. The shift to remote working and learning resulted in an unforeseen demand for enhanced broadband applications and solutions. Coupled with a surge in high-performance compute applications, particularly in support of 5G and automotive applications, the worldwide semiconductor market was stressed in 2020, and is expected to face significant shortages in meeting global demand in 2021. We experienced these supply chain disruptions and semiconductor headwinds in 2020, but our strong relationships and robust ecosystem of supply chain partners allowed us to meet our customers' demands. Our scalable mix of internal and global outsourced manufacturing provided our customers with production continuity. As we look forward in 2021, we see these same headwinds persisting, but we remain confident in our ability to exceed customer expectations while we streamline our manufacturing footprint and further strengthen our supplier partnerships. More than ever before, best-in-class customer relationships are crucial to achieving an effective balance between supply and demand. DZS has partnered with our customers' procurement and engineering teams to mutually enhance demand planning and order fulfillment.

The Acceleration of DZS Mobile Transport

DZS continues to see mobile transport grow as a portion of our overall business. On February 2, 2021, the company shared with the industry that DZS had eclipsed 1.5 million mobile access ports shipped globally. Our record revenue in the second half of 2020 was appreciably influenced by the growth of our mobile edge access transport solutions, especially with customers who were deploying 5G technology. Two of our largest customers during this period were leveraging DZS mobile transport products to support their 5G rollouts. One of these customers, Rakuten, has already scaled beyond 3 million subscribers as they have built out the industry's first commercial Open Radio Access Network (O-RAN) to their LTE and 5G customers. We expect this groundbreaking O-RAN network to be a bellwether for the industry and look forward to additional networks based on the Rakuten model to proliferate in 2021 and beyond.

The Rise of the Converged Edge

New product introductions and technology acquisitions have added coherent optics and long-reach transport solutions to our mobile transport portfolio, as well as the introduction of a unifying network operating system across DZS product lines.

- **The “O-series”** was created via our acquisition of Optelian in February 2021. This product line extended the DZS portfolio of carrier-grade networking products with 100+ gigabit per second (Gbps) transport solutions providing flexibility at the network edge. O-series products feature advanced designs supporting remote and far edge deployment scenarios. As 5G and 10 Gbps services proliferate around the world, the DZS environmentally hardened coherent optical solutions (O-series) will provide compelling options for service providers globally.
- **The DZS Chronos Intelligent Converged Edge Mobile Transport Portfolio** was introduced in February 2021. DZS Chronos provides a comprehensive range of fronthaul/midhaul/backhaul solutions. Open, software defined, and proven, our xHaul solutions feature flexible topologies and architectures, including O-RAN, across packet and optical transport technologies. The O-series coherent optics products for high capacity backhaul transport serve as a powerful enhancement to this portfolio. With the rise of 5G-based networks, success depends on meeting new demands for extreme low latency and high-performance synchronization. DZS meets these requirements with specialized mobile-oriented capabilities including Time Sensitive Networking (TSN), preemption, Grand Master and GPS / GNSS receiver functions.
- **The DZS Velocity Broadband Connectivity Solutions Portfolio** was also introduced in February 2021. DZS Velocity provides carriers with extraordinary flexibility through the latest fiber access technologies and SDN-enabled operational models. In today’s hyper-connected world where the volume of connected devices is exploding, applications demand more bandwidth, and connectivity is increasingly judged by an always-on standard measured in gigabits per second, the DZS Velocity Broadband Access portfolio addresses these challenges head-on with software-enabled agility, high performance, and deployment flexibility that we believe enables carrier network transformation and success.
- **The Unification of the DZS Solutions Portfolio was Enabled by sdNOS**, a modern SDN-enabled Network Operating System that supports an increasingly wide range of DZS fiber-based broadband access systems, switches and routers. Spanning both DZS Chronos and Velocity portfolios, sdNOS allows the full array of DZS broadband and xHaul solutions to be leveraged for virtually any service provider need from the regional datacenter to head end, central office or edge cloud sites, to the far edge of the network.
- **DZS Cloud** was created via our acquisition of RIFT in March 2021. This award-winning end-to-end, carrier-grade orchestration and automation software platform brings new innovation to the DZS product line, including the ability to enable analytics and access orchestration via SDN controls for DZS products. The advanced cloud native software framework will enable new products and modernize the existing software portfolio in the DZS product line. DZS Cloud orchestration will bring advanced 5G slice management capabilities to the service providers including the capability for brownfield discovery of existing manually launched virtual applications.

Board of Directors

On January 1, 2021, the DZS board of directors was enhanced by the appointment of Matt Bross and Barbara Carbone as directors. Each have added diversity and thought leadership to the board as DZS aligns its vision and growth playbook with the expanding mobile and fixed broadband growth opportunities in front of us.

New Headquarters

As of March 15, 2021, the new DZS headquarters in Plano, Texas, including an extensive engineering and customer lab facility, has been fully operational. The Dallas Metroplex provides a strong talent base for DZS, closer proximity to marquee customers and ecosystem partners, as well as favorable financial advantages.

#1 U.S. Based End-to-End Broadband Connectivity Provider

Data from communications analyst firm Omdia has illustrated that DZS shipped more fiber access OLT ports than any other U.S. based supplier in 2020. The fact that DZS is one of a limited number of full-scale, end-to-end access suppliers that is not based in China provides a key advantage to the company, as many countries including the United States, Canada, the United Kingdom, Sweden, Romania, Latvia, Estonia, Poland, Taiwan, Japan, Australia and India, have banned the deployment of some Chinese suppliers due to network security concerns. This represents a long-term growth opportunity and enables DZS to leverage its global footprint that includes Centers of Excellence across the United States, Canada, Europe, the Middle East, South Korea, Japan, Vietnam, and India. In addition to its aforementioned advantages, DZS expects to continue fostering and leveraging its cutting-edge innovation across the globe to lead and stay ahead of its competition.

Open Networks and Global Standards

As a pioneer in mobile edge access and fixed broadband access solutions, DZS is increasingly well-positioned over the last year to capitalize on the global shift towards multi-vendor environments and open networks. The company has fostered and aligned with open standards by supporting O-RAN, Broadband Forum, and Metro Ethernet

Forum reference architectures. In addition, DZS has joined the O-RAN Alliance, Telecom Infra Project, TM Forum, ETSI, and continues a close relationship with Broadband Forum.

We believe that mobile and fixed broadband networks will be increasingly essential to the evolution of broadband services, especially with the micro-cell densification requirements associated with 5G networks. DZS innovation and technology alignment regarding open and standards-based solutions are differentiators for global communications service providers and with the dynamically evolving supplier ecosystem.

Transformative Acquisitions and Balance Sheet

- On Jan. 26, 2021, DZS closed a \$64 million follow-on equity offering, reducing debt to nearly zero and strengthening its balance sheet to support future growth initiatives.
- On Feb. 5, 2021, DZS acquired Optelian, a coherent optics technology innovator specializing in 5G mobile transport solutions with marquee customers in North America.
- On March 4, 2021, DZS acquired network orchestration and automation solutions innovator RIFT. The acquisition included the award-winning, carrier-grade network orchestration and software automation platform that simplifies the deployment of any slice, service or application on any cloud. This acquisition builds upon the 20 million mobile and fixed broadband products DZS has deployed in more than 100 countries, providing a powerful platform for the new DZS Cloud portfolio, with end-to-end intelligence for software and network orchestration and automation, advanced data analytics and service management.



Marquee Customer Spotlight

Backed by our entrepreneurial mindset, DZS has become an integral technology partner to some of the highest profile, most disruptive, and most respected service providers in the world:



TELUS, Canada's marquee mobile operator, selected DZS Cloud for network service orchestration, 5G slice management and software automation. DZS Cloud End-to-End Orchestration and Automation (E2EO) is a carrier-grade, cloud native platform that will simplify and automate the deployment of any slice and any service on any cloud. DZS Cloud E2EO has been tasked with accelerating TELUS' 5G and digital transformation by implementing state-of-the-art cloud native orchestration and automation software for network functions virtualization. DZS is providing TELUS end-to-end network service orchestration with slice management functions and software automation designed to accelerate and manage digital transformation across 5G and broadband services. DZS Cloud E2EO will enable the communications service providers the ability to deliver agile and automated life cycle management of virtual applications and services, unlocking operational cost savings, and decreasing churn and time-to-market by reducing manual application management.



Rakuten, the Japanese e-commerce disruptor, has selected DZS as a key partner to build out and widely deploy the world's first commercial O-RAN network, which has scaled now to over 3 million subscribers. DZS' mobile RAN fronthaul and backhaul products are used to aggregate and manage Rakuten's 4G and 5G traffic. We anticipate that service providers from around the world will find value in the business, financial, and technology advantages of the O-RAN architecture as compared to proprietary and closed mobile network architectures.





Looking Back at 2020

As we review on the milestones achieved in 2020 and the initiatives and workstreams currently underway, one word captures the feeling that surrounds DZS at it exits the year: Acceleration.

The pace of change at DZS continues to hasten as we innovate and integrate, and the opportunities in front of the company continue to grow as we roll out new products, enter new adjacent markets, and expand our SDN and analytics solutions. In addition, market dynamics continue to present new opportunities for DZS to affect change in the industry:

- United States Rural Development Opportunity Fund (RDOF) is a \$20 billion FCC sponsored broadband stimulus initiative designed to financially support under served rural communities in the United States. In 2020, over \$9 billion of this fund was allocated to service providers deploying advanced fiber access and wireless networks across the U.S. DZS is well-positioned to be selected by these awarded service providers, some of whom are already DZS customers, to build out their RDOF subsidized networks. With the remainder of the fund to be auctioned off in 2021, DZS is positioned to make a meaningful difference in one of the largest initiatives to date to bridge the digital divide in America.
- Beyond the role that DZS is playing in providing xHaul solutions to Rakuten's groundbreaking wireless buildout in Japan, Rakuten Mobile has packaged its O-RAN based Rakuten Communications Platform (RCP) and is licensing it to service providers and MVNOs around the world to streamline and accelerate O-RAN advanced wireless initiatives at their respective companies. With over a dozen RCP project underway globally, DZS is well positioned to play a major role in the acceleration of O-RAN networks and their superior network economics globally.
- Quadreal and Andorix, Canada's most forward-thinking real-estate property group and system integrator, respectively, have selected DZS to redefine the economics and carbon footprint of business network deployment across millions of square feet of commercial office space, using Passive Optical Local Area Network (POLAN) technology and architectures to reduce in-building cabling by up to 70%, electrical costs by up to 50%.

The DZS vision and mission are designed to enable and accelerate the hyper-connected world. With more than 20 million products deployed and a trusted presence in networks across over 100 countries delivering next generation 5G and broadband connectivity solutions, DZS is an incumbent and valued technology partner to over a thousand communications service providers that are changing the face of the communications industry globally.

Words of Appreciation

In closing, I want to thank our customers who placed their trust and confidence in DZS to position them to meet the unprecedented challenges of 2020 and the new opportunities that are emerging for them as we accelerate in 2021. I also want to commend our talented employees for their “all-in” commitment, contribution and performance in 2020. Even in the face of some enormously challenging circumstances, they still found a way to deliver on our customer-first philosophy, both in meeting their requirements and delivering an outstanding service experience. I also want to express my gratitude to Mr. Min Woo Nam, the Chairman of the DZS board of directors, for his commitment to DZS success over the past year and our partnership since I joined the company. In addition, I want to recognize our board of directors for their guidance, support and governance throughout 2020. And, finally, I would like to express my sincere appreciation to our shareholders for your continued confidence and commitment to supporting DZS. The leadership team and I are fully committed to delivering the best financial performance possible, balancing short term and long-term strategic decisions with the goal of creating and sustainably growing shareholder value.

Sincerely,



Charlie Vogt
DZS President & CEO

April 13, 2021



**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, 2020

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

DZS 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.)

5700 Tennyson Parkway, Suite 400
Plano, Texas 75024

(Address of principal executive office)

Registrant's telephone number, including area code: (469) 327-1531

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, \$0.001 Par Value	DZSI	The Nasdaq Capital Market

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

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input checked="" 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 has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report.

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 5, 2021, there were 26,840,225 shares outstanding of the registrant's common stock, \$0.001 par value. As of June 30, 2020 (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 \$107,159,920.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for its 2021 Annual Meeting of Stockholders are incorporated by reference into Part III where indicated.

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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, industry 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 plans and our ability to refinance or repay our existing indebtedness prior to the applicable maturity dates; our ability to access other capital to fund our future operations; future economic conditions and performance; the impact of the global outbreak of COVID-19, also known as the coronavirus; the impact of interest rate and foreign currency fluctuations; the relocation of our corporate headquarters to Texas; anticipated performance of products or services; competition; plans, objectives and strategies for future operations, including our pursuit of strategic acquisitions and our continued investment in research and development; 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. Although we believe that the assumptions underlying the forward-looking statements are reasonable, we can give no assurance that our expectations will be attained. Factors which could have a material adverse effect on our operations and future prospects or which could cause actual results to differ materially from our expectations include, but are not limited to:

- the impact of the global outbreak of the coronavirus on the Company’s business and operations, including as a result of travel bans related thereto, the health and wellbeing of our employees in affected areas, disruption of our supply chain and softening of demands for our products;
- our ability to realize the anticipated cost savings, synergies and other benefits of the merger with Dasan Network Solutions, Inc., the acquisition of Keymile GmbH, now DZS GmbH (“Keymile” or “DZS GmbH”) and any integration risks relating to the acquisition of Keymile and other acquisitions, including in connection with the acquisition of the business of RIFT, Inc., a network automation solutions company, and Optelian Access Networks Corporation, a leading optical networking solution provider based in Ottawa, Ontario, Canada, and its portfolio of optical transport solutions;
- our 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;
- our ability to retain our key management personnel;
- 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 network 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; and
- additional factors discussed in Part I, Item 1A “Risk Factors” and Part II, Item 7 “Management’s Discussion and Analysis of Financial Condition and Results of Operations” of this Annual Report on Form 10-K, as well as those described from time to time in our future reports filed with the U.S. Securities and Exchange Commission (the “SEC”).

PART I

ITEM 1. BUSINESS

DZS Inc. (“DZS” or the “Company,”) was incorporated under the laws of the state of Delaware in June 1999. On August 26, 2020, we filed a Certificate of Amendment to our Restated Certificate of Incorporation with the Delaware Secretary of State to change our name from Dasan Zhone Solutions, Inc. to “DZS Inc.”. The Company’s trading symbol “DZSI” did not change.

The mailing address of our worldwide headquarters is 5700 Tennyson Parkway, Suite 400, Plano, Texas 75024, and our telephone number at that location is (469) 327-1531.

Company Overview

We are a global provider of intelligent, packet-based mobile transport and broadband access converged-edge solutions deployed by advanced Tier I, II and regional service providers and enterprise customers. Our solutions are deployed by over 1,000 customers in more than 100 countries worldwide. Our intelligent-edge 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.

We research, develop, test, sell, manufacture and support platforms in the areas of mobile transport and fixed broadband access, as discussed below. We have extensive regional development and support centers around the world to support our customer needs. As of December 31, 2020, we employed over 830 personnel worldwide.

Our Solutions and Platforms

Our network access solutions and communications platforms include products in Mobile Transport and Fixed Broadband Access, which includes broadband access and connected premises.

- *Mobile Transport.* Our mobile transport products provide a robust, manageable and scalable solution for mobile operators that enable them to upgrade their mobile fronthaul/midhaul/backhaul (“xHaul”) systems and migrate to fifth generation wireless technologies (“5G”) and beyond. Our mobile xHaul 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. Our products support pure Ethernet switching as well as layer 3 IP and Multiprotocol Label Switching (“MPLS”), and we interoperate with other vendors in these networks.
- *Fixed Broadband Access.* Our fixed 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. In addition, the switching and routing products we provide in this space offer a high-performance and manageable solution that bridges the gap from carrier access technologies to the core network. Connected premises products are designed for high bandwidth services being deployed to the home or business. Our connected premises portfolio consists of indoor/outdoor ONT gateways delivering best-in-class data throughout to support the most demanding FTTx applications. The product feature set gives service providers an elegant migration path from legacy to softswitch architectures without replacing optical network terminals (“ONTs”).

In addition, we have a Software Defined Networks (“SDN”) and Network Function Virtualization (“NFV”) strategy to develop solutions across these areas. Our SDN/NFV strategy 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 to SDN/NFV will provide better service for end customers and a more efficient and cost-effective use of hardware resources for service providers.

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 subscriber business has resulted in significant investment pressure to upgrade network infrastructure to meet growing bandwidth needs. Broadband access networks must be multiservice in nature and must have extensive quality of service guarantees in order to support 5G, mobile xHhaul, 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 was exacerbated in 2020 by the global COVID-19 pandemic which drove a dramatic rise in remote work and learning as well as entertainment streaming. This increased demand 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 software as a service (SaaS), Cloud, Internet of things (IoT), and 5G have also increased the demand for broadband network access and customer premises solutions. 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 Digital Subscriber Line Access Multiplexer ("DSLAM") 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 Time-division Multiplexing ("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 5G. These technology upgrades are typically accompanied by network infrastructure upgrades, including upgrades to the carriers' access networks (referred to as "mobile xHaul"), core networks and data centers. Our mobile xHaul 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 fronthaul/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 Passive Optical LAN ("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

The principal elements of our strategy include:

- **Global Presence.** We have a diversified customer base that includes more than 1,000 customers in more than 100 countries worldwide. We provide our network access solutions to Tier I, national, and regional carriers in the Asia-Pacific region, the Middle East region and Europe, as well in North America and Latin America. We have recently announced our intent to significantly grow our business in the Americas and in Europe, the Middle East and Africa ("EMEA") to complement our strong presence in Asia and Latin America. We leverage our global infrastructure, including sales offices all over the world, leading research and development centers in the United States of America ("United States" or "U.S."), Germany, the Republic of Korea ("South Korea"), and Vietnam, and manufacturing capabilities in the United States, Germany, South 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 a global industry leader in FTTx ONT and Optical Line Termination ("OLT") portfolio options, we shipped more than 100,000 passive optical network ("PON") OLTs in 2020, which we believe positions us as a top two global 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 and OTT STB capabilities and other service interfaces. In the FTTx OLT category, we offer the industry's

largest portfolio of modular chassis and single platforms for deployment in datacenter, central office, extended temperature environments and multi dwelling unit (MDU) scenarios.

- **Strategic Mergers and Acquisitions.** In addition to organic growth, we may from time to time seek to expand our operations and capabilities through strategic acquisitions.

On February 5, 2021, we acquired Optelian Access Networks Corporation (“Optelian”), a leading optical networking solution provider based in Ottawa, Ontario, Canada, and its portfolio of optical transport solutions. See “—Recent Developments—Optelian Acquisition” for more information on this acquisition.

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 G. Fast technology as well as VoIP gateway features.

- **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 focused on 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 xHaul technology with our leading Tier I carriers, developing a new generation of SDN/NFV solutions for unified wired and wireless networks, upgrading our broadband access technology for 10 and 25/100 gigabyte access speeds, and introducing our cloud managed Wi-Fi solutions and data analytics offerings.
- **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. 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 1000 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, 2020, two customers represented 14% and 13% of net revenue, respectively. For the year ended December 31, 2019, no customer represented 10% of net revenue.

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 (Plano, Texas; Seminole, Florida), South Korea, Vietnam, India and Germany. 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 \$37.5 million and \$38.5 million in 2020 and 2019, 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, both domestically and internationally, 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 100 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.** 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 Sales.** Our Asia-Pacific Sales organization includes coverage of Asia Pacific countries. 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. Our South Korea Sales organization establishes and maintains direct relationships with our South 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 fronthaul/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.

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 (i.e., projects that do not follow a prior work) and brownfield (i.e., projects that modify or upgrade existing infrastructure or products) 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, 2020, our backlog was approximately \$71.0 million, compared to \$80.0 million at December 31, 2019. 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 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 currently face and expect we will continue 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 facilities in Seminole, Florida, USA and Hannover, Germany. For certain products, we rely on subcontractors, primarily located in China, 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. The recent outbreak of the coronavirus in China and other countries has negatively impacted our supply chain in recent months and the continued spread of the virus could further negatively and materially impact our operations. See “Part II, Item 7 – Management’s Discussion and Analysis of Financial Condition and Results of Operations” of this Annual Report on Form 10-K for additional information.

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 have generally been able to have sufficient production capacity to meet demand for our product offerings through a combination of existing and added capacity, additional employees and the outsourcing of products or components. The recent outbreak of the coronavirus in China and other countries has negatively impacted our supply chain in recent months. 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.

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 (a global safety certification company), Quality Management Institute (a management training and leadership company), Telecordia (an operations management and fraud prevention solutions company which is a subsidiary of Ericsson), 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.

Our operations in the European Union are subject to the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Directive and the Waste Electrical and Electronic Equipment Directive. We are aware of and are taking suitable action to comply with the new European Union Restriction of Hazardous Substances standards. Our operations in the United States or other countries, such as Japan and China are subject to similar legislation. 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.

Employees

As of December 31, 2020, we employed over 830 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, or accessible through, 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. The SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC at <http://www.sec.gov>.

ITEM 1A. RISK FACTORS

An investment in our common stock involves a high degree of risk. You should carefully consider the risks described below and the other information in this Annual Report on Form 10-K and in other filings we make with the SEC before making an investment decision. Our business, prospects, financial condition, or operating results could be harmed by any of these risks, as well as other risks not currently known to us or that we currently consider immaterial. If any of such risks and uncertainties actually occurs, our business, financial condition or operating results could differ materially from the plans, projections and other forward-looking statements included in the section titled “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and elsewhere in this report and in our other public filings. The trading price of our common stock could decline due to any of these risks, and, as a result, you may lose all or part of your investment.

Risks Directly Related to the ongoing COVID-19 Pandemic

The COVID-19 pandemic has had a material impact on our business and could have a further material adverse effect on our business, financial condition and results of operations.

In December 2019, a strain of coronavirus, now known as COVID-19, was reported to have surfaced in Wuhan, China. Since that time, the widespread and sustained transmission of the virus has reached global pandemic status. In response to the pandemic, many national and international health agencies have recommended, and many countries and state, provincial and local governments have implemented, various measures, including travel bans and restrictions, limitations on public and private gatherings, business closures or operating restrictions, social distancing, and shelter-in-place orders.

The COVID-19 pandemic had a significant impact on our 2020 results, resulting in decreased revenues, negatively impacting our global supply chain and resulting in softer product demand due to the effects of the pandemic. Although we saw improvement during 2020 in our results, due to the ongoing uncertainty of the COVID-19 pandemic and its effects on our business, there can be no guarantee that this trend will continue, and the COVID-19 pandemic could have a significant negative impact on our results in 2021 and beyond. Given the ongoing and dynamic nature of the COVID-19 virus and the worldwide response related thereto, it is difficult to predict the full impact of the ongoing COVID-19 pandemic on our business. Although the reported cases of COVID-19 have decreased in certain regions of the world, they have continued to increase in others, including the United States and other regions in which we operate, and it is uncertain when the pandemic or its effects will subside. The impact of a continued COVID-19 outbreak or sustained measures taken to limit or contain the outbreak could have a material adverse effect on our business, financial condition, results of operations and cash flows in 2021 and beyond.

Our suppliers and contract manufacturers could fail to provide equipment or service on a timely basis as a result of disruption to the global supply chain due to the ongoing COVID-19 pandemic. If such failures occur, we may be unable to provide products and services as and when requested by our customers. Because of the cost and delays that can be associated with transitioning from one supplier to another, our business could be substantially disrupted if we were required to, or chose to, replace the

products or services of one or more major suppliers with products or services from another source, especially if the replacement became necessary on short notice. Any such disruption could increase our costs, decrease our operating efficiencies and have a material adverse effect on our business and financial condition.

The extent to which the ongoing COVID-19 pandemic impacts us will depend on numerous evolving factors and future developments that we are not able to predict, including: (i) the duration of the pandemic, including the ability of governments and health care providers to timely distribute available vaccines and the efficacy of such vaccines ; (ii) governmental, business and other actions (which could include limitations on our operations or mandates to provide products or services) taken to limit the reach of the virus and the impact of the pandemic; (iii) the impact on our supply chain; (iv) the impact on our contracts with customers and suppliers, including potential disputes over whether COVID-19 constitutes a force majeure event; (v) our eligibility for and receipt of government assistance and tax benefits offered through the Coronavirus Aid, Relief, and Economic Security Act (the “CARES Act”) and any other legislation enacted by the U.S. or other countries in which we operate to mitigate the economic effect of the COVID-19 pandemic; (vi) the impact of the pandemic on worldwide economic activity; (vii) the health of and the effect on our workforce and our ability to meet the staffing needs of our critical functions, particularly if members of our work force are quarantined as a result of exposure or unable to work remotely in areas subject to shelter-in-place orders; (viii) any impairment in value of our tangible or intangible assets that could be recorded as a result of a weaker economic conditions; and (ix) the potential effects on our internal controls including those over financial reporting as a result of changes in working environments such as shelter-in-place and similar orders that are applicable to our team members and business partners, among others.

On-going shelter-in-place orders could adversely impact our supply chains, operations and workforce, and remote working conditions could increase our susceptibility to a data breach.

In response to the ongoing COVID-19 pandemic, many foreign, local and state governments have instituted emergency restrictions that have substantially limited the operation of non-essential businesses and the activities of individuals. Although some local and state governments have begun to lift these restrictions, it is uncertain whether such measures will be successful, and to date, many governments reinstated previously lifted restrictions due to a subsequent increase in COVID-19 cases. As a result of these restrictive measures taken to combat the spread of COVID-19, the majority of our workforce is working remotely from their homes. Remote working conditions may negatively affect our workforce’s productivity, result in disruptions to workflow and operations or make it more difficult for us to maintain proper internal controls over our financial reporting. Further, while we have taken steps to ensure the security of our data and to prevent security breaches, including through the use of authentications and VPNs, many of these measures have been deployed for the first time on a widespread and sustained basis, and there is no guarantee the data security and privacy safeguards we have put in place will be completely effective or that we will not encounter some of the common risks associated with employees accessing Company data and systems remotely. As a result, we may be required to expend significant capital and other resources to protect against security breaches or to alleviate problems caused by security breaches. Further, these ongoing government restrictions have and will continue to have an impact on our global supply chain.

Many of our customers operate in industries that have been disproportionately impacted by the COVID-19 pandemic, and the virus’s negative impact on their financial conditions and results of operations could have an adverse impact on our revenue.

While the industry in which we operate has not been directly impacted to the same extent as other industries, many of our customers in our Enterprise FiberLAN™ business operate in industries such as hospitality, education and stadiums/facilities management, each of which has been greatly impacted by the ongoing COVID-19 pandemic and the protective measures put in place by the local and state governments of the regions in which they operate, such as shelter-in-place orders, business closures, travel restrictions, operating restrictions and cancellations of large events. The adverse impacts that the virus and the accompanying protective measures have on our customers may influence their ability to purchase our products and solutions, make payments under their contracts with us, or it may lower their demand for our products and solutions as they take measures to cut costs and protect their businesses. As a result, our revenue may decline, which could have a material adverse effect on our results of operations and financial condition.

The ongoing COVID-19 pandemic could have a negative impact on the health of our employees which could be disruptive to our business and operations and may negatively impact productivity.

The ongoing COVID-19 pandemic has spread rapidly throughout the United States and the other regions in which we operate. As of December 31, 2020, there have been more than 82 million positive tests for COVID-19 across the globe, with more than 20 million in the United States. If the virus spreads over a large portion of our workforce, it could have a material adverse effect on our operations. Additionally, if a significant number of our executive officers were to contract COVID-19 simultaneously, it could have an adverse effect on our operations, including increased responsibilities for other executives, disruptions in operations or the inability of our executives to focus on essential Company business.

In addition, depending on the extent and duration of the ongoing COVID-19 pandemic, we may be subject to significant increases in healthcare costs if a significant number of our personnel become infected with COVID-19 and require medical treatment. As a result, any significant increases in healthcare costs as a result of COVID-19 or otherwise could have a material adverse impact on our business, financial condition and results of operations.

Further, if any employee, contractor or customer tests positive for COVID-19 as a result of having visited one of our facilities, we could be subject to legal action alleging liability. While many jurisdictions have enacted laws or issued executive orders to protect businesses from claims such as these, there can be no guarantee that every jurisdiction in which we operate will enact such protection or that any claim against us will necessarily fall within the scope of that protection.

Risks Related to our Liquidity

We may not have the liquidity to support our future operations and capital requirements.

As of December 31, 2020, we had approximately \$45.2 million in cash and cash equivalents, including \$32.2 million in cash balances held by our international subsidiaries. If we are unable to raise additional capital, we may be unable to adequately fund our existing operations. Our current liquidity condition exposes us to the following risks: (i) vulnerability to adverse economic conditions in our industry or the economy in general; (ii) a substantial portion of available cash is dedicated to debt servicing, rather than other purposes, including operations and new product innovation; (iii) limitations on our ability to adequately plan for, or react to, changes in our business and industry; and (iv) negative investor and customer perceptions about our financial stability, which could limit our ability to obtain financing or acquire customers.

Our current liquidity condition could be further harmed, and we may incur significant losses or expend significant amounts of capital if: (i) the market for our products develops more slowly than anticipated or if it retracts; (ii) we fail to establish market share or generate revenue at anticipated levels; (iii) our capital expenditure forecasts change or prove to be inaccurate; or (iv) we fail to respond to unforeseen challenges or take advantage of unanticipated opportunities; or (v) the on-going COVID-19 pandemic continues to negatively impact our business or further exacerbates any of the foregoing risks.

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, reduce our operations (including through the sale of assets) or both.

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 a net loss of \$23.1 million and net income of \$13.3 million for the years ended December 31, 2020 and 2019, respectively. Additionally, we have incurred significant losses in prior years. We have an accumulated deficit of \$52.3 million as of December 31, 2020. 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 continue to 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 breaches of representations and warranties made by Keymile in connection with a prior sale of assets by Keymile that survive through 2022. Although the definitive agreement for the Keymile Acquisition entitles us to indemnification for certain losses incurred related to those assumed liabilities, our right to indemnification from the Keymile sellers is limited by the survival period of the representations and warranties included in the Keymile Acquisition definitive agreement and recovery is limited in amount to the purchase price of Keymile, or EUR 10.3 million (approximately \$11.8 million). Additionally, our rights to recovery against such losses is limited under our and third party provided warranty and indemnity liability insurance coverage of up to EUR 35.3 million (approximately \$39.6 million). 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.

Risks from Financial Control Weakness

We previously identified material weaknesses in our internal control over financial reporting, and we cannot provide assurances 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 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. In connection with our audit of the fiscal year 2019 consolidated financial statements, we and our independent registered public accounting firm determined that we had material weaknesses in our internal control over financial reporting. During the year ended December 31, 2020, we implemented enhanced procedures and controls to remediate the material weaknesses in our internal control over financial reporting. We have completed the execution of our remediation plan as of December 31, 2020, and we have concluded the material weaknesses to be remediated as of December 31, 2020.

If additional material weaknesses occur in the future and if we are not able to correct the deficiencies in internal controls in a timely manner, our ability to record, process, summarize and report financial information accurately and within the time periods specified in the SEC's rules and forms will be adversely affected. Such a result could negatively impact the market price and trading liquidity of our common stock, weaken investor confidence in our reported financial information, subject us to civil and criminal investigations and penalties, and generally materially and adversely affect our business and financial condition.

Customer and Product Risk

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 may 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 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: (i) product performance; (ii) interoperability with existing products; (iii) scalability and upgradeability; (iv) conformance to standards; (v) breadth of services; (vi) reliability; (vii) ease of installation and use; (viii) geographic footprints for products; (ix) ability to provide customer financing; (x) pricing; (xi) technical support and customer service; and (xii) 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.

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 have a material adverse effect on our business.

We produce highly complex products that incorporate leading-edge technology, including both hardware and software. Software often 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 damages to our customers, financial or otherwise. 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.

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. Changes in technology, competition, overcapacity, changes in the service provider market, regulatory developments, adverse economic effects caused by the COVID-19 pandemic 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 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.

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, including those affiliated with foreign governments, 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.

There are additional risks to our intellectual property as a result of our international business operations.

We may face risks to our technology and intellectual property as a result of our conducting strategic business discussions outside of the United States, and particularly in jurisdictions that do not have comparable levels of protection of corporate proprietary information and assets such as intellectual property, trademarks, trade secrets, know-how and customer information and records. While these risks are common to many companies, conducting business in certain foreign jurisdictions, housing technology, data and intellectual property abroad, or licensing technology to joint ventures with foreign partners may have more significant exposure. For example, we have shared intellectual properties with entities in China, South Korea, India, Thailand, and Vietnam pursuant to confidentiality agreements in connection with discussions on potential strategic collaborations, which may expose us to material risks of theft of our proprietary information and other intellectual property, including technical data, manufacturing processes, data sets or other sensitive information. Our technology may be reverse engineered by the parties or other parties, which could result in our patents being infringed or our know-how or trade secrets stolen. The risk can be by direct intrusion wherein technology and intellectual property is stolen or compromised through cyber intrusions or physical theft through corporate espionage, including with the assistance of insiders, or via more indirect routes.

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, proceedings alleging patent infringement are routinely commenced in various jurisdictions against manufacturers and consumers of products in the wireless and broadband communications industry. In some cases, courts have issued rulings adverse to such manufacturers and customers, which can result in monetary damages that we are obligated to indemnify or that may impact the cost and availability of components or sales of our products. Courts may also issue injunctions preventing manufacturers from offering, distributing, using or importing products that include the challenged intellectual property. Adverse rulings or injunctive relief awarded against 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.

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, South Korea, and Vietnam, as well as sales and technical support teams in various locations around the world. We continue to consider opportunities to expand 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: (i) unexpected changes in laws, policies and regulatory requirements, including but not limited to regulations related to import-export control; (ii) 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; (iii) 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 South Korea; (iv) political considerations that affect service provider and government spending patterns; (v) heightened political tensions between the U.S. and China regarding the COVID-19 pandemic, trade practices and intellectual property rights; (vi) differing technology standards or customer requirements; (vii) developing and customizing our products for foreign countries; (viii) fluctuations in currency exchange rates, foreign exchange controls and restrictions on cash repatriation; (ix) longer accounts receivable collection cycles and financial instability of customers; (x) requirements for additional liquidity to fund our international operations; (xi) pandemics, epidemics and other public health crises, such as the COVID-19 pandemic; (xii) difficulties and excessive costs for staffing and managing foreign operations; (xiii) ineffective legal protection of our intellectual property rights in certain countries; (xiv) potentially adverse tax consequences; and (xv) 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 South Korea, Japan, India, Vietnam, Europe, Middle East and Latin America, all of which subject us to foreign currency exchange rate risk.

We have in the past and may in the future undertake a 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.

Risks Related to our Industry

The telecommunications networking business requires the application of complex revenue and expense recognition rules and the regulatory environment affecting generally accepted accounting principles is uncertain. Changes in financial accounting standards or practices may cause adverse, unexpected financial reporting fluctuations and harm our business.

The nature of our business requires the application of complex revenue and expense recognition rules and the current regulatory environment affecting U.S. GAAP is uncertain. Significant changes in U.S. GAAP could affect our financial statements going forward and may cause adverse, unexpected financial reporting fluctuations and harm our operating results. U.S. GAAP is subject to interpretation by the Financial Accounting Standards Board, the Securities and Exchange Commission (SEC) and various bodies formed to promulgate and interpret appropriate accounting principles. In addition, we have in the past and may in the future need to significantly change our customer contracts, accounting systems and processes when we adopt future or proposed changes in accounting principles. The cost and effect of these changes may negatively impact our results of operations during the periods of transition.

Changes in government regulations related to our business could harm our 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.

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.

Risks Related to our Common Stock

DNI owns a significant amount of our outstanding common stock and has the ability to exert significant influence or control over any matters that require stockholder approval, including the election of directors and the approval of certain transactions, and DNI’s interests may conflict with our interests and the interests of other stockholders.

As of December 31, 2020, DNI owned approximately 43.2% of the outstanding shares of our common stock, representing a significant amount of the votes entitled to be cast by the holders of our outstanding common stock at a stockholder meeting. After our sale of shares of common stock in January 2021, DNI owned approximately 37.6% of the outstanding shares of our common stock. See “—Recent Developments—Equity offering” for more information on the sale of shares of common stock. Due to its significant ownership percentage of our common stock, DNI has the ability to substantially influence or control the outcome of any matter submitted for the vote of our stockholders, including the election of directors and the approval of certain transactions. The interests of DNI may conflict with the interests of our other stockholders or with holders of our indebtedness and may cause us to take actions that our other stockholders or holders of our indebtedness do not view as beneficial.

DNI’s large concentration of stock ownership may make it more difficult for a third party to acquire us or discourage a third party from seeking to acquire us. Any potential third-party acquirer would most likely need 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.

Additionally, two of the Company’s directors serve as executive officers of DNI – Min Woo Nam is the Chief Executive Officer and Chairman of the Board of Directors of DNI and Choon Yul Yoo is the Chief Operating Officer of DNI. Messrs. Nam and Yoo owe fiduciary duties to us and, in addition, have duties to DNI. As a result, these directors may face real or apparent conflicts of interest with respect to matters affecting both us and DNI.

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, 2020 was approximately 62,000 shares 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.

DNI, our largest stockholder, owned approximately 9.5 million shares of our common stock as of December 31, 2020 and has registered those shares with the SEC for resale. After our sale of shares of common stock in January 2021, DNI owned approximately 10.1 million shares of our common stock. See “—Recent Developments—Equity offering” for more information on the sale of shares of common stock. Its shares became eligible for resale without restriction as to volume limitations. 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.

We do not expect to declare or pay dividends in the foreseeable future.

We do not expect to declare or pay dividends in the foreseeable future, as we anticipate that we will invest future earnings in the development and growth of our business. Therefore, holders of our common stock will not receive any return on their investment unless they sell their securities, and holders may be unable to sell their securities on favorable terms or at all.

General Risk Factors

We may need additional capital, and we cannot be certain that additional financing will be available.

In January 2021, we raised approximately \$60.2 million in an equity offering. Refer to Note 17, Subsequent Events, in the consolidated financial statements, for more detail. We need sufficient capital to fund our ongoing operations and may require additional financing in the future to expand our business, acquire assets or repay or refinance our existing debt. Our ability to obtain financing will depend, among other things, on our development efforts, business plans, operating performance and condition of the capital markets at the time we seek financing. We cannot assure you that additional financing will be available to us on favorable terms when required, or at all. If we raise additional funds through the issuance of equity, equity-linked or debt securities, those securities may have rights, preferences or privileges senior to the rights of our common stock, and our stockholders may experience dilution.

If we need additional capital and cannot raise it on acceptable terms, we may not be able to, among other things: (i) maintain existing operations; (ii) pay ordinary expenses; (iii) fund our business expansion or product innovation; (iv) pursue future business opportunities, including acquisitions; (v) respond to unanticipated capital requirements; (vi) repay or refinance our existing debt; (vii) hire, train and retain employees; or (viii) respond to competitive pressures or unanticipated working capital requirements.

Our failure to do any of these things could seriously harm our business, financial condition, liquidity and operating results. 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.

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: (i) commercial acceptance of our products and services; (ii) fluctuations in demand for network access products; (iii) fluctuation in gross margin; (iv) our ability to attract and retain qualified and key personnel; (v) the timing and size of orders from customers; (vi) the ability of our customers to finance their purchase of our products as well as their own operations; (vii) new product introductions, enhancements or announcements by our competitors; (viii) our ability to develop, introduce and ship new products and product enhancements that meet customer requirements in a timely manner; (ix) changes in our pricing policies or the pricing policies of our competitors; (x) the loss of or failure to renew on commercially reasonable terms any third-party licenses necessary for or relating to our products; (xi) the ability of our company and our contract manufacturers to attain and maintain production volumes and quality levels for our products; (xii) our ability to obtain sufficient supplies of sole or limited source components; (xiii) increases in the prices of the components we purchase, or quality problems associated with these components; (xiv) unanticipated changes in regulatory requirements which may require us to redesign portions of our products; (xv) changes in accounting rules; (xvi) integrating and operating any acquired businesses; (xvii) our ability to achieve targeted cost reductions; (xviii) how well we execute on our strategy and operating plans; (xix) general economic conditions as

well as those specific to the communications, internet and related industries; and (xx) the economic uncertainty created by the ongoing COVID-19 pandemic, including its potentially adverse impact on all the foregoing factors.

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. Further, the ongoing COVID-19 pandemic has resulted in severe disruption and volatility in the financial markets. 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.

Strategic acquisitions or investments that we have made or that we could pursue or make in the future may disrupt our operations and harm our business, operations, financial condition, and liquidity.

As part of our business strategy, we have made investments in and acquired other companies, including Optelian and RIFT in 2021 and Keymile in 2019, that we believe are complementary to our core business. In the future we may continue to make investments in or acquire other companies or complementary solutions or technologies. Any such acquisition or investment may divert the attention of management and cause us to incur various expenses in identifying, investigating, and pursuing suitable opportunities, whether or not the transactions are completed, and may result in unforeseen operating difficulties and expenditures. These transactions could also result in dilutive issuances of equity securities, the incurrence of debt or assumption of liabilities, and increase our risk of litigation exposure, which could adversely affect our operating results. In addition, if the resulting business from such a transaction fails to meet our expectations, our operating results, business, and financial condition may suffer or we may be exposed to unknown risks or liabilities.

Additionally, any significant acquisition would require the consent of our lenders. Any failure to receive such consent could delay or prohibit us from acquiring companies that we believe could enhance our business. Furthermore, we may dedicate significant time and capital resources in the pursuit of acquisition opportunities and may be unable to find and identify desirable acquisition targets or business opportunities or be successful in entering into an agreement with any particular strategic partner.

Upon the closing of any acquisition transaction, we will need to integrate the acquired organization and its products and services with our legacy operations. The integration process 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 subject to increased risk and 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 Optelian and DZS GmbH's telecommunication systems business, include those associated with: (i) failure to successfully further develop the acquired products or technology; (ii) insufficient revenues to offset increased expenses associated with acquisitions and where competitors in such markets have stronger market positions; (iii) conforming the acquired company's standards, policies, processes, procedures and controls with our operations; (iv) difficulties in entering markets in which we have no or limited prior experience; (v) difficulties in integrating the operations, technologies, products and personnel of the acquired companies; (vi) coordinating new product and process development, especially with respect to highly complex technologies; (vii) 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; (viii) hiring and training additional management and other critical personnel; (ix) 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; (x) increasing the scope, geographic diversity and complexity of our operations; (xi) 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; (xii) 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; (xiii) the geographic distance between the companies; (xiv) failure to comply with covenants related to the acquired business; (xv) 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; (xvi) litigation or other claims in connection with the acquired company, including claims for terminated employees, customers, former stockholders or other third parties; and (xvii) the disruption, economic and otherwise, created by the on-going COVID-19 pandemic, including its potentially compounding effect on all the foregoing factors.

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, including as a result of conditions created by the ongoing COVID-19 pandemic, our business, operations, financial condition and liquidity will be materially harmed.

Increased tariffs on products and goods that we purchase from off-shore sources (particularly Chinese sources) and changes in international trade policies and relations could have an adverse effect on our customers and operating results.

The pricing of our products to customers and our ability to conduct business with certain customers can be affected by changes in U.S. and other countries' trade policies. For example, before the trade deal was signed between the U.S. and China on January 15, 2020, the United States had imposed tariffs on a wide-range of products and goods manufactured in China that are directly or indirectly imported into the United States. In response, various countries and economic regions announced plans or intentions to impose retaliatory tariffs on a wide-range of products they import from the United States. Any newly imposed, announced and threatened U.S. tariffs and retaliatory tariffs could have the effect of increasing the cost of materials we use to manufacture certain products, which could result in lower margins. The tariffs could also result in disruptions to our supply chain, as suppliers struggle to fill orders from companies trying to purchase goods in bulk ahead of announced tariffs. Although we believe that the incremental costs to us of these tariffs were immaterial, if new tariffs are imposed or if new tariffs apply to additional categories of components used in our manufacturing activities, and if we are unable to pass on the costs of tariffs to our customers, our operating results would be harmed.

Governmental policy changes regarding tariffs could shift under the new United States presidential administration. The administration has signaled that it will take a measured approach, considering all factors, and considering all options. As a result, no clear indication has yet been provided by the administration with regards to tariffs on Chinese and other imports. For its part, China has called for a reset in relations between the United States and China, though no clear policy proposals have yet been provided. Changes in political environments, governmental policies, international trade policies and relations, including as a result of tensions between the United States and China regarding the COVID-19 pandemic, trade practices and the protection of intellectual property rights, could result in revisions to laws or regulations or their interpretation and enforcement, trade sanctions, or retaliatory actions by China in response to U.S. actions, which could have an adverse effect on our customers, business plans and operating results.

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.

The loss of a key customer or a significant deterioration in the financial condition of a key customer could have a material adverse effect on the Company's results of operations.

The Company's revenue is dependent on several key customers. A loss of one or more of the Company's key customers, or a dispute or litigation with one of these key customers could affect adversely our revenue and results of operations. A significant deterioration in the financial condition or bankruptcy filing of a key customer could affect adversely the Company's business, results of operations, and financial condition.

In addition, the Company is subject to credit risk associated with the concentration of accounts receivable from its key customers. As of December 31, 2020, two customers represented 17% and 16% of net accounts receivable. As of December 31, 2020, the Company has an allowance for doubtful account of \$3.1 million related to one customer. If one or more of the Company's top customers were to become bankrupt or insolvent or otherwise were unable to pay for the products and services provided by the Company, including as a result of conditions created by the on-going COVID-19 pandemic, the Company may incur significant write-offs of accounts receivable or incur other impairment charges, which may have a material adverse effect on the Company's results of operations.

We have experienced significant turnover with respect to our executives and our board, and our business could be adversely affected by these and other transitions in our senior management team or if any future vacancies cannot be filled with qualified replacements in a timely manner.

We have experienced significant turnover on our executive team and board since 2018. As a result of this turnover, our remaining management team has been required to take on increased responsibilities, which could divert attention from key business areas. If we continue to experience similar turnover in the future, we may be unable to timely replace the talent and skills of our management team and directors.

Management transitions are often difficult and inherently cause some loss of institutional knowledge, which could negatively affect our results of operations and financial condition. Our ability to execute our business strategies may be adversely affected by the uncertainty associated with these transitions and the time and attention from the board and management needed to fill any future vacant roles could disrupt our business. If we are unable to successfully identify and attract adequate replacements for future vacancies in our management roles in a timely manner, we could experience increased employee turnover and harm to our business, growth, financial condition, results of operations and cash flows. We face significant competition for executives with the qualifications and experience we seek.

Further, we cannot guarantee that we will not face similar turnover in the future. Our senior management's knowledge of our business and industry would be difficult to replace, and any further turnover could negatively affect our business, growth, financial conditions, results of operations and cash flows.

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

We have historically used equity incentives, including 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. As discussed elsewhere in these Risk Factors, we have experienced significant turnover on our executive team and board since 2018, including the departures of our former Chief Executive Officer and Chief Financial Officer. The loss of the services of any of our key employees or executive officers 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 historical inability to attract and retain sufficient qualified accounting personnel with expertise in U.S. GAAP has adversely affected our ability to maintain an effective system of internal controls and our ability to produce reliable financial reports, which could materially and adversely affect our business.

Our collection, processing, storage, use, and transmission of personal data could give rise to liabilities as a result of governmental regulation, increasing legal requirements.

We collect, process, store, use, and transmit personal data on a daily basis. Personal data is increasingly subject to legal and regulatory protections around the world, which vary widely in approach and which possibly conflict with one another. In recent

years, for example, U.S. legislators and regulatory agencies, such as the Federal Trade Commission, as well as U.S. states have increased their focus on protecting personal data by law and regulation and have increased enforcement actions for violations of privacy and data protection requirements. The State of California recently adopted the California Consumer Protection Act (“CCPA”), which went into effect on January 1, 2020. The European Commission also approved and adopted the General Data Protection Regulation (GDPR), a data protection law, which became effective in May 2018. These data protection laws and regulations are intended to protect the privacy and security of personal data that is collected, processed, and transmitted in or from the relevant jurisdiction. Both the CCPA and the GDPR established new requirements applicable to the processing of personal data, afford new data protection rights to individuals and impose significant penalties for data breaches. Individuals also have a right to compensation under the GDPR for financial or non-financial losses. In July 2020, the EU-U.S. Privacy Shield framework which allowed U.S. companies that self-certify to the U.S. Department of Commerce and publicly commit to comply with specified requirements to import personal data from the EU was invalidated as a GDPR compliance mechanism by the European Court of Justice (“ECJ”). These developments create some uncertainty. Ensuring compliance with these laws is an ongoing commitment that involves substantial costs, which could otherwise adversely affect our business operations and negatively impact our financial position or cash flows. Any failure to comply with applicable regulations could also result in regulatory enforcement actions against us, subject us to negative publicity and significant penalties and ultimately cause an adverse effect on our business.

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. In response to the COVID-19 pandemic, a large portion of our workforce is working remotely, and such remote working could exacerbate any of the foregoing risks.

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. Implementation of and compliance with these laws may be costly or could otherwise adversely affect our business operations, which could negatively impact our financial position or cash flows. 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.

Failure to comply with the U.S. Foreign Corrupt Practices Act and similar laws associated with our international activities could subject us to significant civil or criminal penalties.

Failure to comply with the Foreign Corrupt Practices Act could subject us to significant civil or criminal penalties. A significant portion of our revenues is generated from sales outside of the United States. As a result, we are subject to the U.S. Foreign Corrupt Practices Act (the “FCPA”). The FCPA generally prohibits U.S. companies and their intermediaries from making corrupt payments to foreign officials for the purpose of obtaining or keeping business or otherwise obtaining favorable treatment and requires companies to maintain adequate record-keeping and internal accounting practices to accurately reflect the transactions of the company. The FCPA applies to companies, individual directors, officers, employees and agents. Under the FCPA, U.S. companies may be held liable for the corrupt actions taken by employees, strategic or local partners or other representatives. If we or our intermediaries fail to comply with the requirements of the FCPA or similar legislation, governmental authorities in the U.S. and elsewhere could seek to impose civil and/or criminal fines and penalties which could have an adverse effect on our results of operations, financial condition and cash flow.

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

Market turbulence and weak economic conditions, including those caused by the on-going COVID-19 pandemic, 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, South Korea, Germany, or the rest of the world.

Natural disasters, public health crises, political crises, and other catastrophic events or other events outside of our control may damage our facilities or the facilities of third parties on which we depend, and could materially impact our supply chain and the operations of our customers and suppliers.

Our global headquarters are located in Plano, Texas and subject to disruption from natural causes beyond our control, including physical risks from tornados, severe storms, floods, other natural disaster or power shortages or outages that could disrupt operations or impair critical systems. Any of these disruptions or other events outside of our control could affect our business negatively, harming our operating results. In addition, in the event any of our facilities or the facilities of our suppliers, contract manufacturers, third-party service providers, or customers, is affected by natural disasters, such as hurricanes, earthquakes, tsunamis, power shortages or outages, floods or monsoons, public health crises, such as pandemics and epidemics, including the ongoing COVID-19 pandemic to the extent not already occurring, political crises, such as terrorism, war, political instability or other conflict, or other events outside of our control, our business and operating results could suffer. Disasters occurring at our or our vendors' facilities also could impact our reputation.

Any of the foregoing events may have the effect of disrupting our supply chain, which could harm our business, financial condition results of operations. Illness, travel restrictions, absenteeism, or other workforce disruptions could negatively affect our supply chain, manufacturing, distribution, or other business processes. We may face additional production disruptions in the future, which may place constraints on our ability to produce products in a timely manner or may increase our costs.

Future issuances of additional equity securities could result in dilution of existing stockholders' equity ownership.

We may determine from time to time to issue additional equity securities (see “—Recent Developments—Equity offering” for details on the sale of shares of our common stock in January of 2021) to raise additional capital, to support growth, or, as we have in recent years, to make acquisitions. Further, we may issue stock options, grant restricted stock awards or other equity awards to retain, compensate and/or motivate our employees and directors. These issuances of our securities could dilute the voting and economic interests of existing stockholders.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None

ITEM 2. PROPERTIES

On August 1, 2020, the Company completed its relocation of its corporate headquarters from Oakland, California to Plano, Texas and established a new U.S.-based Engineering Center of Excellence in Plano. On February 24, 2020, in connection with the planned relocation of the Company headquarters to Plano, the Company entered into two separate sublease agreements for office and laboratory space in Plano, Texas. All three leases permit management to stipulate minimal construction and design preferences. We also lease facilities for office space in Seoul, South Korea as well as lease facilities for manufacturing, research and development purposes at locations in the United States including Seminole, Florida, and Alpharetta, Georgia, as well as Hannover, Germany, through the acquisition of Keymile. 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, 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, results of operations or cash flows. 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 and cash flows of the reporting period in which the ruling occurs, or future periods.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

Set forth below is information concerning our executive officers as of December 31, 2020.

<u>Name</u>	<u>Age</u>	<u>Office</u>
Charles Daniel Vogt	57	Chief Executive Officer, President
Thomas J. Cancro	53	Chief Financial Officer and Treasurer
Justin Ferguson	43	Chief Legal Officer and Corporate Secretary

Charlie Vogt was appointed as the President and Chief Executive Officer of the DZS Inc., effective August 1, 2020. In addition, Mr. Vogt was elected as a member of the Board of Directors, also effective August 1, 2020. In connection with Mr. Vogt's appointment, Il Yung Kim ceased to serve as President and Chief Executive Officer of DZS Inc. and as a member of the Board effective July 31, 2020. Prior to joining the Company, Mr. Vogt was most recently President and Chief Executive Officer of ATX Networks, a leader in broadband access and media distribution, where he led the company through extensive transformation and growth since February 2018 and will remain a member of the board. From July 2013 to January 2018, Mr. Vogt served as President and Chief Executive Officer of Imagine Communications, where he directed the company through change as it evolved its core technology, including large-scale restructuring and rebranding and multiple technology acquisitions as he implemented a vision and growth strategy. Before joining Imagine Communications, Mr. Vogt was President and Chief Executive Officer of GENBAND (today known as Ribbon Communications), where he transformed the company from a startup to a global leader in voice over IP and real-time IP communications solutions. His professional career has also included leadership roles at Taqua (Tekelec), Lucent Technology (Nokia), Ascend Communications (Lucent), ADTRAN, Motorola and IBM.

Thomas J. Cancro was appointed to the position of Chief Financial Officer and Corporate Treasurer on November 25, 2019. Mr. Cancro recently served as Controller of GE Global Research, General Electric Company’s technology research and IP-licensing business unit. Prior roles include executive positions at Verizon Communications Inc. (“Verizon”), including Chief Financial Officer of Verizon’s joint venture with AT&T Inc. and Deutsche Telekom AG, and an executive role in Verizon’s Treasury organization, where he advised the company as to capital markets strategy. He also served as Chief Accounting Officer and Corporate Controller of GFI Group Inc., a FinTech provider of wholesale brokerage services and SaaS software solutions (now a subsidiary of BGC Partners, Inc.), and as Senior Vice President and Corporate Controller of MasTec, Inc., a Fortune 500 telecommunications and energy infrastructure service provider. Mr. Cancro holds a Bachelor of Science degree in Accounting from the Pennsylvania State University and began his career at PricewaterhouseCoopers LLP. He is a Certified Public Accountant and also holds a CFA Charter.

Justin K. Ferguson has served as Chief Legal Officer and Corporate Secretary since September 2020. Prior to joining DZS, from 2018 to 2020, Mr. Ferguson was the Executive Vice President, General Counsel and Corporate Secretary of Ribbon Communications Inc., a Nasdaq listed company that provides real time communications software and packet and optical transport solutions. Prior to joining Ribbon, from 2015 to 2018, Mr. Ferguson was the Vice President, General Counsel and Corporate Secretary of Zix Corporation, a Nasdaq listed company that provides email security solutions. From 2011 to 2015, Mr. Ferguson served as Senior Vice President—Director of Legal for GENBAND. Prior to GENBAND, he was an attorney at the law firms of Weil, Gotshal & Manges LLP and Baker Botts L.L.P. Mr. Ferguson received a Juris Doctorate degree from Texas Tech University School of Law and a Bachelor's degree in Business Administration from Texas Tech University. He is a member of the State Bar of Texas.

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”.

As of March 4, 2021, we had 496 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

Not Required

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 I, national, and regional service providers and enterprise customers. We research, develop, test, sell, manufacture and support communications equipment in mobile transport and fixed broadband, which includes broadband access and connected premises, and Software and Services:

- Our mobile transport products provide a robust, manageable and scalable solution for mobile operators that enable them to upgrade their mobile fronthaul/backhaul systems and migrate to 5G 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 Multiprotocol Label Switching ("MPLS") interfaces and interoperate with other vendors in these networks.
- Our broadband access products, which now includes our switching and routing 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 connected premises products are designed for high bandwidth services being deployed to the home or business. Our connected premises portfolio consists of indoor/outdoor Optical Network Terminal ("ONT") gateways delivering best-in-class data throughout to support the most demanding Fiber To The X ("FTTx") applications. The product feature set gives service providers an elegant migration path from legacy to softswitch architectures without replacing ONTs.
- Our Software and Services offering consists of Software Defined Networking ("SDN") Orchestration solutions and Professional and Technical Support services. Our SDN Orchestration 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/Network Function Virtualization ("NFV") will provide better service for end customers and a more efficient and cost-effective use of hardware resources for service providers. Our services offerings designed to help our customers rapidly deploy, scale and optimize their broadband networks for agility and reliability.

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.

Recent Developments

On March 8, 2021, DZS made the strategic decision, subject to the proper involvement of the employee representatives, to transition DZS GmbH to a sales and research and development center. Negotiations are being held with the works council in Germany on a reconciliation of interests and a social plan. DZS GmbH is expecting to reduce headcount by approximately 100 employees.

On March 4, 2021, we announced our acquisition of the business of RIFT, Inc., a network automation solutions company.

On February 5, 2021, we acquired Optelian Access Networks Corporation, a leading optical networking solution provider based in Ottawa, Ontario, Canada, and its portfolio of optical transport solutions.

On January 26, 2021, we entered into an underwriting agreement to sell 4.6 million shares of Common Stock (including 0.6 million shares issued pursuant to the underwriters' option to purchase additional shares) at a price of \$14.00 per share in an underwritten public offering. The equity offering closed on January 29, 2021 and resulted in gross proceeds of approximately \$64.4 million and net proceeds, after deducting underwriting discounts and commissions and offering expenses, of approximately \$60.2 million. We used a portion of the net proceeds from the equity offering to pay off the entire outstanding balance of debt with related parties.

Effective August 1, 2020, Charlie Vogt was appointed as the President and Chief Executive Officer of the Company. In addition, Mr. Vogt was elected as a member of the Board, also effective August 1, 2020. In connection with Mr. Vogt's appointment, Il Yung Kim ceased to serve as President and Chief Executive Officer of the Company and as a member of the Board effective July 31, 2020. Prior to joining the Company, Mr. Vogt was most recently President and Chief Executive Officer of ATX Networks, a leader in broadband access and media distribution, where he led the company through extensive transformation and growth since February 2018 and where he remains a member of the board. From July 2013 to January 2018, Mr. Vogt served as President and Chief Executive Officer of Imagine Communications, where he directed the company through change as it evolved its core technology, including large-scale restructuring and rebranding and multiple technology acquisitions as he implemented a vision and growth strategy. Before joining Imagine Communications, Mr. Vogt was President and Chief Executive Officer of GENBAND (today known as Ribbon Communications), where he transformed the company from a startup to a global leader in voice over IP and real-time IP communications solutions. His professional career has also included leadership roles at Taqua (Tekelec), Lucent Technology (Nokia), Ascend Communications (Lucent), ADTRAN, Motorola and IBM.

On August 1, 2020, the Company completed the relocation of its corporate headquarters from California to Plano, Texas. In connection with the relocation, the Company entered into sublease agreements to sublease an aggregate of approximately 16,300 square feet located at 5700 Tennyson Parkway, Plano, Texas. In September 2020, the Company entered into a lease agreement for approximately 10,300 square feet of additional office space at its headquarters in Plano, TX. The Company retains 16,500 square feet of leased space located in Alameda, California.

Trends and Uncertainties

In December 2019, a strain of coronavirus, now known as COVID-19, was reported to have surfaced in Wuhan, China. Since that time, the widespread and sustained transmission of the virus has reached global pandemic status. In response to the pandemic, many national and international health agencies have recommended, and many countries and state, provincial and local governments have implemented, various measures, including travel bans and restrictions, limitations on public and private gatherings, business closures or operating restrictions, social distancing, and shelter-in-place orders. The health effects of the pandemic and the above measures taken in response thereto have had an effect on the global economy in general and has materially impacted and will likely continue to impact the Company's financial condition, results of operations and cash flows. Given the ongoing and dynamic nature of the virus and the worldwide response related thereto, it is difficult to predict the full impact of the COVID-19 pandemic on our business. During the twelve months ended December 31, 2020, the Company's revenues declined relative to its prior expectations, in part due to the COVID-19 pandemic. Due to the uncertainty around the future economic impact of the pandemic, the fair value measurements used in the Company's impairment assessments could be negatively impacted and could result in future impairments of goodwill, intangibles and other long-lived assets.

The impact of a continued COVID-19 pandemic or sustained measures taken to limit or contain the outbreak could continue to have a material adverse effect on our business, financial condition, results of operations, and cash flows.

As discussed further in Note 1 to the consolidated financial statements below, the Company has a past-due receivables balance of \$17.3 million from a customer in India, for which the Company recorded an allowance for doubtful accounts of \$3.1 million during the year ended December 31, 2020, leaving a remaining unreserved accounts receivable balance of \$14.2 million. If the Company's efforts to collect the outstanding balance under the terms of the agreement are not successful, the Company may recognize an additional allowance for all, or substantially all, of the remaining \$14.2 million balance in a future period.

Impact of Inflation and Changing Prices

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, 2020.

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.

	December 31,	
	2020	2019
Net revenue	100%	100%
Cost of revenue	68%	67%
Gross profit	32%	33%
Operating expenses:		
Research and product development	12%	13%
Selling, marketing, general and administrative	21%	20%
Intangibles impairment charge	2%	—
Restructuring and other charges	—	2%
Amortization of intangible assets	1%	—
Goodwill impairment charge	—	—
Total operating expenses	36%	35%
Operating income (loss)	(4)%	(2)%
Interest income	—	—
Interest expense	(1)%	(1)%
Loss on debt extinguishment	(1)%	—
Other income (expense), net	(1)%	—
Income (loss) before income taxes	(7)%	(3)%
Income tax provision (benefit)	1%	1%
Net income (loss)	(8)%	(4)%
Net income (loss) attributable to non-controlling interest	—	—
Net income (loss) attributable to DZS Inc.	(8)%	(4)%

2020 COMPARED WITH 2019

Net Revenue

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

	2020	2019	Increase (Decrease)	% change
Products	\$ 281.0	\$ 286.3	\$ (5.3)	-1.9%
Services	19.6	20.6	(1.0)	-4.6%
	<u>\$ 300.6</u>	<u>\$ 306.9</u>	<u>\$ (6.3)</u>	<u>-2.0%</u>

Net revenue decreased 2.0% or \$6.3 million to \$300.6 million for 2020 compared to \$306.9 million for 2019. The decrease in product revenue was primarily due to impacts from the worldwide COVID-19 pandemic in the first half of 2020, which resulted in disruptions to our supply chain, as well as decreased business operations by certain of our customers earlier in 2020, partially offset by increasing sales of fiber access products in the second half of 2020 and an increase in sales for our next generation mobile edge access transport and fixed broadband access solutions.

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

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

	2020	2019	Increase (Decrease)	% change
Revenue by geography:				
Americas	\$ 61.9	\$ 64.8	\$ (2.9)	-4.5%
Europe, Middle East, Africa	64.6	78.4	(13.8)	-17.6%
Asia	174.1	163.7	10.4	6.4%
Total	\$ 300.6	\$ 306.9	\$ (6.3)	-2.0%

The decrease in net revenue in the Americas was primarily due to a decline in the first half of the year primarily impacts from the worldwide COVID-19 pandemic, partially offset by increasing sales of fiber access products in the second half of 2020. The decline in net revenue within EMEA were due to lower sales of copper-based broadband access solutions as the industry shifts to fiber-based broadband solutions as well as the DZS exit from a lower margin contract manufacturing agreement. Increased sales in Asia was primarily driven by increase sales in South Korea and Japan, for our next generation mobile edge access transport and fixed broadband access solutions.

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 decreased 1.5% to \$203.8 million for 2020, compared to \$206.8 million for 2019. Total cost of revenue was 67.8% of net revenue for 2020, compared to 67.4% of net revenue for 2019, which resulted in a decrease in gross profit percentage to 32.2% in 2020 from 32.6% in 2019. The decrease in total cost of revenue, was primarily due to the mix of products sold.

We expect that in the future our cost of revenue as a percentage of net revenue will vary depending on the geographic and product mix and average selling prices of products sold. 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 development expenses include personnel costs, outside contractor and consulting services, depreciation on lab equipment, costs of prototypes and overhead allocations. Research and product development expenses decreased by 2.7% to \$37.5 million for 2020 compared to \$38.5 million for 2019. The decrease was primarily due to decreased research and product development expenses which was due in part to lower headcount related costs, partially offset by higher outsourced costs.

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 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.

Selling, marketing, general and administrative expenses increased 4.6% to \$64.0 million for 2020 compared to \$61.2 million for 2019. The increase in selling, marketing, general and administrative expenses was primarily due to the increase in allowance for doubtful accounts for one customer in India. Refer to Note 1 in the consolidated financial statements, for further details on the bad debt expense.

Restructuring and Other Charges

During the year ended December 31, 2020, the Company recorded no restructuring and other charges compared to \$4.9 million for the year ended December 31, 2019.

Intangible Asset and Goodwill Impairment Charge

During the fourth quarter of 2020, the Company recorded an impairment charge of \$6.5 million for DZS GmbH intangible assets as part of the Company's evaluation for impairment, based on a triggering event for potential impairment. During the

fourth quarter of 2019, the Company recorded an impairment charge of \$1.0 million for DZS GmbH goodwill as part of the Company's 2019 annual evaluation of goodwill for impairment.

Interest Expense, net

Interest expense, net was \$2.0 million and \$3.5 million for 2020 and 2019, respectively. This decrease in interest expense was primarily related to lower average borrowings and borrowing rates during 2020.

Loss on Debt Extinguishment

During March 2020, the Company paid the outstanding term loan borrowings in full and terminated the PNC Credit Facilities. In association with this debt repayment, the Company recorded a loss on extinguishment of debt of \$1.4 million. There was no debt extinguishment in 2019.

Other Income (Expense), net

Other income (expense) relates mainly to realized and unrealized foreign exchange gains and losses. Other expense, net was \$3.7 million for 2020 compared to other income, net of \$0.9 million in 2019. The main reason for the increase in other expense, net was due to foreign currency exchange losses in 2020.

Income Tax Provision (Benefit)

We recorded an income tax expense of \$3.5 million for 2020, roughly flat to the \$3.6 million incurred in 2019. Despite consolidated net losses, we incur income tax expense due to taxable income generated in South Korea and Japan.

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) the impact of material transactions or events that we believe are not indicative of our core operating performance, such as merger and acquisition transaction costs, inventory valuation step-up amortization, purchase price adjustments, restructuring and other charges, goodwill impairment, bargain purchase gain, gain (loss) on sale of assets, impairment of long-lived assets or loss on debt extinguishment, bad debt expense related to a large customer in India, any of which may or may not be recurring in nature. 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,	
	2020	2019
Net income (loss)	\$ (23,082)	\$ (13,263)
Add (deduct):		
Interest expense, net	1,958	3,525
Income tax (benefit) provision	3,501	3,585
Restructuring and other charges	—	4,908
Goodwill impairment charge	—	1,003
Intangibles impairment charge	6,472	—
Depreciation and amortization	5,143	5,115
Stock-based compensation	4,613	3,508
Inventory step-up amortization	—	577
Merger and acquisition transaction costs	—	337
Headquarters relocation	61	—
Executive transition	2,047	—
Bad debt expense *	3,119	—
Loss on debt extinguishment	1,369	—
Adjusted EBITDA	<u>\$ 5,201</u>	<u>\$ 9,295</u>

* Refer to Note 1 in the consolidated financial statements, for further details on the bad debt expense.

LIQUIDITY AND CAPITAL RESOURCES

Our operations have historically and continue to be financed through a combination of our existing cash and cash equivalents, cash generated in the business, borrowings, and sales of equity.

The following table summarizes the information regarding our cash and cash equivalents and working capital (in thousands):

	December 31, 2020	December 31, 2019
Cash and cash equivalents	\$ 45,219	\$ 28,747
Working capital	123,285	114,885

The Company had a net loss of \$23.1 million for the year ended December 31, 2020 and net loss of \$13.3 million for the year ended December 31, 2019.

As of December 31, 2020, we had an accumulated deficit of \$52.3 million and working capital of \$123.3 million. As of December 31, 2020, we had \$45.2 million in cash and cash equivalents, which included \$32.2 million in cash balances held by our international subsidiaries, and \$43.6 million in aggregate principal debt. On January 29, 2021, the Company closed an equity offering and resulted in gross proceeds to the Company of approximately \$64.4 million and net proceeds, after deducting underwriting discounts and commissions and offering expenses, of approximately \$60.2 million. We used a portion of the net proceeds from the equity offering to pay off the entire outstanding balance of debt with related parties.

We continue 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 rationalize the number of products we sell, adjust our manufacturing footprint, and reduce our operations in low margin regions, including reductions in headcount. Based on our current plans and current business conditions, we believe that these measures along with our existing cash and cash equivalents will be sufficient to satisfy our anticipated cash requirements for at least the next 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 12 months will depend on our ability (i) to achieve forecasted results of operations, and (ii) continue to effectively manage working capital requirements. While we believe that we are likely to achieve forecasted results of operations if we are successful in implementing our business strategies, the impact of the COVID-19 pandemic provides great uncertainty with respect to a potential impact on our future operations.

Operating Activities

Net cash provided by (used in) by operating activities during the year ended December 31, 2020 and 2019 was \$5.1 million and (\$22.7) million, respectively. The \$27.8 million increase in cash provided by operating activities in 2020 was primarily due improved management of working capital compared to 2019.

Investing Activities

Net cash used in investing activities during the year ended December 31, 2020 was \$2.3 million and consists of purchases of property, plant and equipment, compared with \$7.0 million of net cash used in investing activities during the year ended December 31, 2019 which consisted of purchases of property, plant and equipment and the Keymile acquisition.

Financing Activities

Net cash provided by financing activities totaled \$17.6 million during the year ended December 31, 2020 and consisted primarily of proceeds from borrowings of \$32.1 million, proceeds from factored accounts receivable of \$11.6 million and proceeds from exercise of stock options and employee stock purchases of \$3.7 million, partially offset by a net outflow associated with the repayment of short-term borrowings of \$16.7 million and the repayment of long-term debt of \$13.1 million. This compared to cash provided by financing activities of \$28.0 million during the year ended December 31, 2019.

Debt Facilities

DNI Loan

In February 2016, Dasan Network Solutions, Inc. (“DNS California”), a wholly-owned, direct subsidiary of the Company and the sole stockholder of DNS Korea, borrowed \$1.8 million from Dasan Networks, Inc. (“DNI”) for capital investment with an interest rate of 4.6% per annum, payable quarterly. On February 27, 2019, in connection with the entry into the PNC Credit Facilities, the Company amended the terms of this loan to extend the repayment date to May 27, 2022. As of December 31, 2020, \$1.8 million was outstanding.

In March 2018, DNS Korea borrowed KRW 6.5 billion (\$5.8 million USD) from DNI of which KRW 5.0 billion (\$4.5 million USD) was repaid on August 8, 2018. The loan bears interest at a rate of 4.6%. On February 27, 2019, in connection with the entry into the PNC Credit Facilities, we amended the terms of this loan to extend the repayment date to May 27, 2022. As of December 31, 2020, KRW 1.5 billion (\$1.4 million USD) was outstanding.

In December 2018, we 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, in connection with the entry into the PNC Credit Facilities, we amended the terms of the term loan to extend the repayment date until May 27, 2022 and to terminate any security granted to DNI with respect to such term loan. As of December 31, 2020, \$6.0 million was outstanding.

The modifications resulting from the amendments described in the three preceding paragraphs were limited to the extension of the maturity dates and removal of the collateral on the outstanding term loans with DNI. There were no fees paid to DNI or external costs otherwise incurred in connection with these modifications.

On March 5, 2020, DNS Korea, the Company’s wholly-owned, indirect subsidiary entered into a Loan Agreement with DNI (the “March 2020 DNI Loan”). The March 2020 DNI Loan was negotiated and approved on behalf of the Company and its subsidiaries by a special committee of the Board of Directors of the Company (the “Special Committee”) consisting of directors determined to be independent from DNI. The March 2020 DNI Loan consists of a term loan in the amount of KRW 22.4 billion (\$18.5 million USD) with interest payable semi-annually at an annual rate of 4.6% and maturing on March 11, 2022. No principal payments are due on the March 2020 DNI Loan until the maturity date, but DNS Korea may prepay the loan, or a portion thereof, without penalty. As of December 31, 2020, KRW 22.4 billion (\$20.6 million USD) was outstanding.

As security for the March 2020 DNI Loan (and other existing loans between DNI and DNS Korea and/or DNS California), (i) DNS California, a wholly-owned, direct subsidiary of the Company and the sole stockholder of DNS Korea, agreed to pledge the outstanding shares of DNS Korea to DNI and (ii) DNS Korea granted a security interest in its personal property assets, accounts receivable and intellectual property assets to DNI. The March 2020 DNI Loan includes certain covenants consisting of financial reporting obligations, a maintenance covenant whereby DNS Korea agreed to maintain a minimum stockholders’ equity value in an amount equal to or greater than KRW 43.3 billion (\$35.8 million), and customary events of default. If an event of default occurs and is not remedied within the applicable cure period, DNI will be entitled to take various actions, including requiring the immediate repayment of all outstanding amounts under the March 2020 DNI Loan and selling the shares or assets of DNS Korea.

DNS Korea loaned the funds borrowed under the March 2020 DNI Loan to the Company, and the Company used a portion of such funds to repay in full and terminate the PNC Credit Facilities, described below.

In February 2021, the Company paid off the entire outstanding balance of debt with DNI with proceeds of its issuance of shares of its common stock during January of 2021.

PNC Credit Facilities

In February 2019, the Company and ZTI (collectively, the “Borrowers”), and certain direct and indirect subsidiaries of the Borrowers, as guarantors, entered into a Revolving Credit, Term Loan, Guaranty and Security Agreement (the “Domestic Credit Agreement”) and an 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”) and Citibank, N.A. as lenders, and PNC as agent for the lenders (the “PNC Credit Facilities”), which replaced the Company’s former senior secured credit facilities with Wells Fargo Bank (the “Former WFB Facility”). We refer to such transactions and the agreements referenced above as the “PNC Credit Facilities.”

The PNC Credit Facilities provided 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 was able to borrow on the revolving line of credit at any time was based on eligible accounts receivable and other conditions, less certain reserves. Borrowings under the PNC Credit Facilities bore interest at a floating rate equal to either the PNC prime rate or the LIBOR rate for the applicable period, plus a margin that was based on the type of advance.

The Company used a portion of the funds borrowed from the term loan under the PNC Credit Facilities to (i) repay \$5.0 million of 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 collateralize \$3.6 million in outstanding letters of credit under the Former WFB Facility, and (iii) repay \$5.6 million in short-term debt in Korea and Japan. The Company’s obligations under the PNC Credit Facilities were secured by substantially all of the personal property assets of the Company and its subsidiaries that were co-borrowers or guarantors under the PNC Credit Facilities, including their intellectual property.

The PNC Credit Facilities had a three-year term and were scheduled to mature on February 27, 2022. The PNC Credit Facilities contemplated repayment of the term loan in quarterly installments over the term of the loan, with the balance of the term loan and revolving line of credit due at maturity.

In July 2019, \$4.4 million in outstanding borrowings under the revolving line of credit (which represented all outstanding borrowings under the revolving line of credit) was repaid in full and in March 2020, the Company paid the outstanding term loan borrowings in full and terminated the PNC Credit Facilities. In association with this debt repayment, the Company recorded a loss on extinguishment of debt of \$1.4 million during the three months ended March 31, 2020.

Bank and Trade Facilities - Foreign Operations

On June 1, 2020, DZS Japan entered into an assignment agreement with JECC Corporation to factor JPY 1,258,822,828 (approximately \$11.7 million) of accounts receivables from one of its customers. JECC assessed a discount equivalent to JPY 5,964,328 (approximately \$0.05 million) (or approximately 0.474% of the amount factored, with a stated factoring rate of 1.575% based on the days remaining from factoring to expected receivable collection). DZS Japan received JPY 1,252,858,500 (approximately \$11.65 million) on June 19, 2020. In accordance with ASC 860, *Transfers and Servicing of Financial Assets*, this agreement is accounted for as a secured borrowing. The collection of the underlying accounts receivable occurred during 2020 and there was no secured borrowing balance as of December 31, 2020.

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, 2020 and December 31, 2019, we had an aggregate outstanding balance of \$13.8 million and \$15.8 million, respectively, under such financing arrangements, and the interest rate per annum applicable to outstanding borrowings under these financing arrangements as of December 31, 2020 and December 31, 2019 ranged from 0% to 2.3% and 0% to 4.5%, respectively.

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, 2020, two customers accounted for 17% and 16%, respectively, of our net accounts receivable. As of December 31, 2020, the Company has an allowance for doubtful account of \$3.1 million related to one customer. Refer to Note 1 Organization and Summary of Significant Accounting Policies, for further detail. Our receivables from customers in countries other than the U.S represented 89% 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, 2020, our future contractual commitments by fiscal year were as follows (in thousands):

	Payments due by period					
	Total	2021	2022	2023	2024	2025 and thereafter
Operating leases	\$ 23,175	\$ 5,489	\$ 5,075	\$ 4,627	\$ 4,124	\$ 3,860
Purchase commitments	8,030	8,030	—	—	—	—
Short-term debt - bank and trade facilities	13,787	13,787	—	—	—	—
Long-term debt - related party*	29,766	—	29,766	—	—	—
Total future contractual commitments	<u>\$ 74,758</u>	<u>\$ 27,306</u>	<u>\$ 34,841</u>	<u>\$ 4,627</u>	<u>\$ 4,124</u>	<u>\$ 3,860</u>

* In February 2021, we paid down the remaining long-term debt following the stock issuance in January 2021.

Operating Leases

Future minimum operating lease obligations in the table above include primarily payments for our office locations and manufacturing, research and development locations, which expire at various dates through 2025. See Note 13 “Leases” of the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for further discussion regarding our operating leases.

Purchase Commitments

The purchase commitments shown above represent non-cancellable inventory purchase commitments as of December 31, 2020. See Note 14 “Commitments and Contingencies” of the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for further discussion regarding our purchase commitments.

Short-term and Long-term Debt

The 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. See Note 7 “Debt” of the Notes to Consolidated Financial Statements included in this Annual Report on Form 10-K for further discussion regarding our operating leases.

Postretirement obligations

The Company’s pension plan obligations are excluded, since the plan is unfunded, and the timing and amount of any cash payments are uncertain. Refer to Note 15 of the consolidated financial statement for more detailed.

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 to five 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.

For contracts with customers that contain multiple performance obligations, 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 on a standalone basis. Unsatisfied and partially unsatisfied performance obligations as of the end of the reporting period primarily consist of 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 we have a right to consideration and record accounts receivable when we have 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. For certain products or services and customer types, we require payment before the products or services are delivered to the customer.

Allowances for Doubtful Accounts

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 in 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. We also evaluate the terms of our agreements with our suppliers and establish accruals for estimated losses on adverse purchase commitments as necessary, applying the same lower of cost or net realizable value approach that is used to value inventory.

Goodwill and Long-lived Assets

Goodwill and other acquisition-related intangible assets not subject to amortization are tested annually for impairment and are tested for impairment more frequently if events and circumstances indicate that the asset might be impaired. The quantitative goodwill impairment test is a two-step process with step one requiring the comparison of the reporting unit's estimated fair value with the carrying amount of its net assets. If necessary, step two of the impairment test determines the amount of goodwill impairment to be recorded when the reporting unit's recorded net assets exceed its fair value.

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. Factors the Company considers important which could trigger an impairment review, include, but are not limited to, significant changes in the manner of use the 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. 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. 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. An impairment loss is recognized to the extent that the carrying amount exceeds the asset's fair value. In the application of 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.

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 in the transaction.

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 use 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.

The Company does not recognize a tax benefit unless it concludes that it is more likely than not that the benefit will be sustained on audit by the taxing authority based solely on the technical merits of the associated tax position. If the recognition threshold is met, the Company recognizes a tax benefit measured at the largest amount of the tax benefit that, in the Company's judgment, is greater than 50 percent likely to be realized. The Company records interest and penalties related to uncertain tax positions in interest expense and in general and administrative expense, respectively.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISKS

Not required.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

DZS INC. AND SUBSIDIARIES

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No financial statement schedules are required because all the relevant data is included elsewhere in these consolidated financial statements.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
DZS Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of DZS Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2020 and 2019, the related consolidated statements of comprehensive income (loss), stockholders’ equity and non-controlling interest, and cash flows for each of the years then ended, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the Company’s internal control over financial reporting as of December 31, 2020, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”), and our report dated March 11, 2021 expressed an unqualified opinion.

Basis for opinion

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

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

Critical audit matter

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

Realization of past due receivable

As described further in Note 1 to the financial statements, the Company has \$17.3 million in accounts receivable due from a customer located in India, that are past due under the original sales terms. The Company is actively working with the customer and representatives in India to arrange payment of the remaining balance. Management expects to collect the net remaining balance outstanding of this receivable. In the event that the Company’s efforts to work with the customer and representatives in India prove unsuccessful, management may seek payment through other remedies in the agreement. As of December 31, 2020, the Company recorded an allowance for doubtful accounts of \$3.1 million for this receivable. Management will continue to evaluate the collectability of this receivable as more information becomes available. If the Company’s efforts to collect the outstanding balance under the terms of the agreement are not successful, the Company may recognize an additional allowance for all, or substantially all, of the remaining \$14.2 million balance in a future period. We identified the realization of this receivable as a critical audit matter.

The principal considerations for our determination that the realization of this receivable is a critical audit matter are due to the consideration of various qualitative factors used in the Company’s evaluation of the realization of this receivable, including economic and business conditions in India, current operations of the customer, timing and adequacy of government funding, the status of current negotiations, and projections related to future cash flows. These factors considered by management require a high degree of judgment and subjectivity and are difficult to ascertain.

Our audit procedures related to the realization of this receivable included the following, among others.

- We tested the design and operating effectiveness of key controls related to estimating the realization of the receivable.

- We obtained and tested the Company's key inputs and assumptions used to estimate the realization of the receivable.
- We obtained and read operational communication, to the extent available, between the Company and the customer during calendar 2020 and 2021. We also obtained evidence of Company inquiries with the customer to collect the receivable and the customer responses.
- We confirmed the receivable balance as of November 30, 2020 and noted no activity of the customer balance to December 31, 2020.
- We obtained letters from the Company's internal and external legal counsel which discussed the Company's rights under the contract and counsel's opinion regarding the status of this collection contingency.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2019.

Dallas, Texas
March 11, 2021

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
DZS Inc.

Opinion on internal control over financial reporting

We have audited the internal control over financial reporting of DZS Inc. and subsidiaries (the “Company”) as of December 31, 2020, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2020, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the consolidated financial statements of the Company as of and for the year ended December 31, 2020, and our report dated March 11, 2021 expressed an unqualified opinion on those financial statements.

Basis for opinion

The Company’s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s Annual Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company’s internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and limitations of internal control over financial reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

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

/s/ GRANT THORNTON LLP

Dallas, Texas
March 11, 2021

DZS INC. AND SUBSIDIARIES

**Consolidated Balance Sheets
(In thousands, except par value)**

	As of December 31,	
	2020	2019
Assets		
Current assets:		
Cash and cash equivalents	\$ 45,219	\$ 28,747
Restricted cash	9,200	4,646
Accounts receivable - trade, net of allowance for doubtful accounts	97,253	96,865
Other receivables	9,165	8,124
Inventories	39,572	35,439
Contract assets	6,182	16,680
Prepaid expenses and other current assets	5,332	4,185
Total current assets	211,923	194,686
Property, plant and equipment, net	7,146	6,769
Right-of-use assets from operating leases	18,483	20,469
Goodwill	3,977	3,977
Intangible assets, net	3,377	12,381
Deferred tax assets, net	1,405	1,622
Other assets	5,919	6,243
Total assets	<u>\$ 252,230</u>	<u>\$ 246,147</u>
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable - trade	\$ 49,250	\$ 41,585
Short-term debt - Bank and trade facilities	13,787	17,484
Contract liabilities - current	4,400	3,567
Operating lease liabilities - current	4,494	4,201
Accrued and other liabilities	16,707	12,964
Total current liabilities	88,638	79,801
Long-term debts		
Bank and trade facilities	—	9,937
Related party	29,754	9,096
Contract liabilities - non-current	2,471	3,230
Operating lease liabilities - non-current	15,959	18,154
Pension liabilities	20,052	17,671
Other long-term liabilities	1,777	1,710
Total liabilities	158,651	139,599
Commitments and contingencies (Note 14)		
Stockholders' equity		
Common stock, authorized 36,000 shares, 21,958 and 21,419 shares outstanding as of December 31, 2020 and 2019, respectively, at a \$0.001 par value	22	21
Additional paid-in capital	147,997	139,700
Accumulated other comprehensive loss	(2,124)	(3,939)
Accumulated deficit	(52,316)	(29,234)
Total stockholders' equity	93,579	106,548
Total liabilities and stockholders' equity	<u>\$ 252,230</u>	<u>\$ 246,147</u>

See accompanying notes to consolidated financial statements.

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

	Years Ended December 31,	
	2020	2019
Net revenue	\$ 300,640	\$ 306,882
Cost of revenue	203,761	206,771
Gross profit	96,879	100,111
Operating expenses:		
Research and product development	37,459	38,516
Selling, marketing, general and administrative	64,041	61,206
Amortization of intangible assets	1,432	1,507
Intangibles impairment charge	6,472	-
Restructuring and other charges	-	4,908
Goodwill impairment charge	-	1,003
Total operating expenses	109,404	107,140
Operating income (loss)	(12,525)	(7,029)
Interest income	77	456
Interest expense	(2,035)	(3,981)
Loss on debt extinguishment	(1,369)	-
Other income (expense), net	(3,729)	876
Income (loss) before income taxes	(19,581)	(9,678)
Income tax provision (benefit)	3,501	3,585
Net income (loss)	\$ (23,082)	\$ (13,263)
Net income (loss) attributable to non-controlling interest	-	194
Net income (loss) attributable to DZS Inc.	\$ (23,082)	\$ (13,457)
Foreign currency translation adjustments	2,796	(1,939)
Actuarial gain (loss) for pension plan	(981)	(1,793)
Comprehensive income (loss)	\$ (21,267)	\$ (16,995)
Comprehensive income attributable to non-controlling interest	-	209
Comprehensive income (loss) attributable to DZS Inc.	\$ (21,267)	\$ (17,204)
Basic earnings (loss) per share attributable to DZS Inc.	\$ (1.07)	\$ (0.69)
Diluted earnings (loss) per share attributable to DZS Inc.	\$ (1.07)	\$ (0.69)
Weighted average shares outstanding used to compute basic net income (loss) per share	21,588	19,403
Weighted average shares outstanding used to compute diluted net income (loss) per share	21,588	19,403

See accompanying notes to consolidated financial statements.

DZS INC. AND SUBSIDIARIES

**Consolidated Statements of Stockholders' Equity and Non-Controlling Interest
Years ended December 31, 2020 and 2019
(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						
Balance as of December 31, 2018	16,587	\$ 16	\$ 93,192	\$ (192)	\$ (15,777)	\$ 77,239	\$ 615	\$ 77,854
Issuance of common stock in public offering, net of issuance costs	4,718	5	42,504	—	—	42,509	—	42,509
Purchase of non- controlling interest in subsidiary	—	—	(127)	—	—	(127)	(824)	(951)
Exercise of stock options and employee stock plan purchases	114	—	623	—	—	623	—	623
Stock-based compensation	—	—	3,508	—	—	3,508	—	3,508
Net loss	—	—	—	—	(13,457)	(13,457)	194	(13,263)
Other comprehensive income (loss)	—	—	—	(3,747)	—	(3,747)	15	(3,732)
Balance as of December 31, 2019	21,419	21	139,700	(3,939)	(29,234)	106,548	—	106,548
Exercise of stock options and employee stock plan purchases	539	1	3,684	—	—	3,685	—	3,685
Stock-based compensation	—	—	4,613	—	—	4,613	—	4,613
Net loss	—	—	—	—	(23,082)	(23,082)	—	(23,082)
Other comprehensive income (loss)	—	—	—	1,815	—	1,815	—	1,815
Balance as of December 31, 2020	<u>21,958</u>	<u>\$ 22</u>	<u>\$ 147,997</u>	<u>\$ (2,124)</u>	<u>\$ (52,316)</u>	<u>\$ 93,579</u>	<u>\$ —</u>	<u>\$ 93,579</u>

See accompanying notes to consolidated financial statements.

DZS INC. AND SUBSIDIARIES
Consolidated Statements of Cash Flows
(In thousands)

	Years Ended December 31,	
	2020	2019
Cash flows from operating activities:		
Net income (loss)	\$ (23,082)	\$ (13,263)
Adjustments to reconcile net income (loss) to net cash provided by (used in) operating activities:		
Depreciation and amortization	5,143	5,115
Intangibles impairment charge	6,472	-
Loss on debt extinguishment	1,343	-
Goodwill impairment charge	-	1,003
Amortization of deferred financing cost	149	664
Stock-based compensation	4,613	3,508
Provision for inventory write-down	5,531	2,984
Allowance for doubtful accounts	3,833	155
Provision for sales returns	1,303	370
Unrealized loss (gain) on foreign currency transactions	2,875	158
Deferred income taxes	316	1,130
Loss on disposal of property, plant and equipment	18	-
Changes in operating assets and liabilities, net of acquisitions:		
Accounts receivable	(18,782)	(23,072)
Inventories	(6,916)	4,802
Contract assets	11,341	(5,962)
Prepaid expenses and other assets	1,525	(7,688)
Accounts payable	11,136	10,340
Accrued and other liabilities	(1,767)	854
Contract liabilities	13	(3,800)
Net cash provided by (used in) operating activities	5,064	(22,702)
Cash flows from investing activities:		
Purchases of property, plant and equipment	(2,270)	(2,314)
Acquisition of business, net of cash acquired	-	(4,660)
Net cash used in investing activities	(2,270)	(6,974)
Cash flows from financing activities:		
Proceeds from issuance of common stock in public offerings, net of issuance costs	-	42,509
Proceeds from short-term borrowings and line of credit	13,774	49,243
Repayments of short-term borrowings and line of credit	(16,696)	(69,357)
Proceeds from long-term borrowings	-	25,000
Repayments of long-term borrowings	(13,125)	(11,875)
Proceeds from related party term loan	18,361	-
Repayments of related party term loan	-	(5,000)
Proceeds from factored accounts receivable	11,645	-
Financing cost - debt issuance	(20)	(2,148)
Purchase of non-controlling interest	-	(951)
Proceeds from exercise of stock options and employee stock plan purchases	3,685	623
Net cash provided by financing activities	17,624	28,044
Effect of exchange rate changes on cash, cash equivalents, and restricted cash	534	(381)
Net increase (decrease) in cash, cash equivalents and restricted cash	20,952	(2,013)
Cash, cash equivalents and restricted cash at beginning of period	33,635	35,648
Cash, cash equivalents and restricted cash at end of period	<u>\$ 54,587</u>	<u>\$ 33,635</u>
Reconciliation of cash, cash equivalents and restricted cash to statement of financial position		
Cash and cash equivalents	\$ 45,219	\$ 28,747
Restricted cash	9,200	4,646
Long-term restricted cash	168	242
	<u>\$ 54,587</u>	<u>\$ 33,635</u>
Supplemental disclosure of cash flow information:		
Cash paid during the period for:		
Interest - bank and trade facilities	\$ 788	\$ 2,786
Interest - related party	\$ 981	\$ 509
Income taxes	\$ 2,645	\$ 2,017

See accompanying notes to consolidated financial statements.

DZS INC. AND SUBSIDIARIES
Notes to Consolidated Financial Statements

(1) Organization and Summary of Significant Accounting Policies

(a) Description of Business

DZS 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, national, and regional service providers and enterprise customers. On August 26, 2020, the Company filed a Certificate of Amendment to their Restated Certificate of Incorporation with the Delaware Secretary of State reflecting a company name change from Dasan Zhone Solutions, Inc. to DZS Inc. 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.

DZS was incorporated under the laws of the state of Delaware in June 1999. The Company is headquartered in Plano, Texas with flexible in-house production facilities in Seminole, Florida and Hannover, Germany, and contract manufacturers located in China, India, Korea and Vietnam. The Company also maintains offices to provide sales and customer support at global locations. On August 1, 2020, the Company relocated its corporate headquarters from California to Plano, Texas and established a new U.S.-based Engineering Center of Excellence in Plano.

(b) 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 had a controlling interest. Refer to Note 11 to the consolidated financial statements for additional information on non-controlling interest. All inter-company transactions and balances have been eliminated in consolidation. Certain prior-year amounts have been reclassified to conform to the current-year presentation.

(c) Related Party Transactions

The financial statements include disclosures of material related party transactions. However, disclosure of transactions that are eliminated in the preparation of consolidated financial statements are not required to be disclosed. As of December 31, 2020, Dasan Networks, Inc. (“DNI”) owned approximately 43.2% of the outstanding shares of the Company's common stock. See Note 7 and Note 12 to the consolidated financial statements for additional information about related party transactions.

(d) 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 loss of \$23.1 million for the year ended December 31, 2020 and net loss of \$13.3 million for the year ended December 31, 2019. As of December 31, 2020, the Company had an accumulated deficit of \$52.3 million and working capital of \$123.3 million. As of December 31, 2020, the Company had \$45.2 million in cash and cash equivalents, which included \$32.2 million in cash balances held by its international subsidiaries, and \$43.6 million in aggregate principal debt of which \$13.8 million was reflected in current liabilities. On January 29, 2021, the Company closed an equity offering which resulted in net proceeds to the Company of approximately \$60.2 million. The Company used a portion of the net proceeds from the Equity Offering to pay off the entire remaining outstanding balance of debt with related parties. Refer to Note 17 Subsequent Events, for more details.

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 12 months from the date of this Annual Report on Form 10-K.

The Company’s ability to meet its obligations as they become due in the ordinary course of business for the next 12 months will depend on its ability (i) to achieve forecasted results of operations, and (ii) continue to effectively manage working capital requirements. Management’s belief that it will achieve forecasted results of operations assumes that, among other things, the Company will continue to be successful in implementing its business strategy.

In December 2019, a strain of coronavirus, now known as COVID-19, was reported to have surfaced in Wuhan, China. Since that time, the widespread and sustained transmission of the virus has reached global pandemic status. In response to the pandemic, many national and international health agencies have recommended, and many countries and state, provincial and local governments have implemented, various measures, including travel bans and restrictions, limitations on public and private gatherings, business closures or operating restrictions, social distancing, and shelter-in-place orders. The health effects of the pandemic and the above measures taken in response thereto have had an effect on the global economy in general and have materially impacted and will likely continue to impact the Company’s financial condition, results of operations and cash flows. Given the ongoing and dynamic nature of the virus and the worldwide response related thereto, it is difficult to predict the full

impact of the COVID-19 pandemic on our business. Due to the uncertainty around the future economic impact of the pandemic, the fair value measurements used in the Company's impairment assessments could be negatively impacted and could result in future impairments of goodwill, intangibles and other long-lived assets. During the three months ended December 31, 2020 and September 30, 2020, the Company's revenues increased by 14% and 31%, respectively, compared to the three months ended December 31, 2019 and September 30, 2019. The impact of a continued COVID-19 pandemic or sustained measures taken to limit or contain the outbreak could continue to have a material and adverse effect on our business, financial condition, results of operations, and cash flows.

Concentration of Risk

Financial instruments, which potentially subject the Company to concentrations of credit risk, consist primarily of cash and cash equivalents, accounts receivable and contract assets. Cash and cash equivalents consist principally of financial deposits and money market accounts. Cash and cash equivalents are principally held with various 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, 2020, two customers represented 14% and 13% of net revenue, respectively. For the year ended December 31, 2019, no customer represented 10% or more of net revenue.

As of December 31, 2020, two customers represented 17% and 16% of net accounts receivable, respectively. As of December 31, 2019, two customers represented 18% and 11% of net accounts receivable, respectively. As of December 31, 2020 and December 31, 2019, receivables from customers in countries other than the United States represented 89% and 94% of net accounts receivable, respectively.

(e) Consolidated Subsidiaries

Details of the Company's consolidated operating subsidiaries as of December 31, 2020 and 2019 are as follows:

	Location	Percentage of ownership (%)	
		December 31, 2020	December 31, 2019
Dasan Network Solutions, Inc. (U.S. subsidiary)	US	100%	100%
Dasan Network Solutions, Inc. (Korean subsidiary)	Korea	100%	100%
DZS Japan, Inc.	Japan	100%	100%
DASAN Vietnam Company Limited	Vietnam	100%	100%
D-Mobile Limited	Taiwan	100%	100%
DASAN India Private Limited	India	99.99%	99.99%
DZS GmbH (formerly Keymile GmbH)	Germany	100%	100%

(f) 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.

(g) Revenue Recognition

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, which the Company typically considers a formality. In situations when the customer acceptance terms are more than a formality, transfer of control occurs upon obtaining the signed acceptance certificate from the customer. 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.

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 to five 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.

For contracts with customers that contain multiple performance obligations, 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. Unsatisfied and partially unsatisfied performance obligations as of the end of the reporting period primarily consist of products and services for which customer purchase orders have been accepted and that are in the process of being delivered.

The Company records contract assets when it has a right to consideration and records accounts receivable when it has an unconditional right to consideration. The Company records contract liabilities when cash payments are received (or unconditional rights to receive cash) in advance of fulfilling its performance obligations.

The Company's payment terms vary by the type and location of its customer and the products or services offered. For certain products or services and customer types, the Company requires payment before the products or services are delivered to the customer.

Other related policies and revenue information

Warranties

Products sold to customers include standard warranties, typically for one year, covering bug fixes and 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. Instead, the expected cost of warranty is accrued as expense in accordance with applicable guidance. Optional extended warranties, typically between one and three years, and for up to five years, 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.

The Company records estimated costs related to standard warranties 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.

Contract Costs

The Company recognizes an asset for certain costs to fulfill a contract if it is determined that the costs relate directly to a contract or anticipated contracts that can be specifically identified, generate, or enhance resources that will be used in satisfying performance obligations in the future, and are expected to be recovered. Such costs are amortized on a systematic basis that is consistent with the transfer to the customer of the goods to which the asset relates. Contract costs primarily consist of sales commissions that are amortized as sales and marketing expense. If the service period, inclusive of any anticipated renewal, is longer than a year, the incremental direct costs are capitalized and amortized over the period of benefit.

Financing

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. During the year ended December 31, 2020 and 2019, such financing components were not significant.

Bill-and-hold

The Company recognizes revenue from the sale of products when control has passed to the customer, which is based on the shipping terms of the arrangement, when significant risk and rewards have transferred to the customer. In some instances, the customer agrees to buy product from the Company but requests delivery at a later date, commonly known as bill-and-hold arrangements. For these transactions, the Company deems that control passes to the customer when the product is ready for delivery. The Company recognizes products held for delivery when a signed agreement is in place, the transaction is billable, and the customer has significant risk and rewards for the products, the ability to direct the assets, the products have been set aside specifically for the customer, and cannot be redirected to another customer.

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 majority of the Company's performance obligations in its contracts with customers relate to contracts with duration of less than one year. The Company does not disclose the value of unsatisfied performance obligations for contracts with an original expected length of one year or less, based on the elected practical expedients. The transaction price allocated to noncancellable unsatisfied performance obligations included in contracts with duration of more than 12 months is reflected in contract liabilities – non-current on the consolidated balance sheets.

Disaggregation of Revenue

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

	Years ended December 31,	
	2020	2019
Revenue by products and services:		
Products	\$ 280,988	\$ 286,292
Services	19,652	20,590
Total	<u>\$ 300,640</u>	<u>\$ 306,882</u>

Information about the Company's net revenue for North America and international markets for 2020 and 2019 is summarized below (in thousands):

	Years ended December 31,	
	2020	2019
Revenue by geography:		
Americas	\$ 61,900	\$ 64,847
Europe, Middle East, Africa	64,580	78,375
Asia	174,160	163,660
Total	<u>\$ 300,640</u>	<u>\$ 306,882</u>

(h) Allowances for Doubtful Accounts and Sales Returns

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 under 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 and current collection trends, as well as on specific balances where collectability may be uncertain. Though the allowance for doubtful accounts at each balance sheet date represents the Company's best estimate at that point in time, an increase to the allowance for doubtful accounts may be required in the future based on updated estimates of customers' ability or willingness to pay, or may be reduced if previously reserved balances are ultimately collected.

In 2017, the Company entered into an agreement with a customer in India to supply product for a state sponsored broadband

project. The Company completed its performance obligations under the agreement in 2018, and all amounts due were billed under the terms of the arrangement by December 31, 2020. Since 2017, the Company billed the customer approximately \$59.0 million and collected payments of approximately \$41.7 million, leaving a balance of approximately \$17.3 million as of December 31, 2020, that is substantially beyond the payment terms.

The Company is actively working with the customer and representatives in India to arrange payment of the remaining balance. Management expects to collect the net remaining balance outstanding of this receivable. In the event that the Company's efforts to work with the customer and representatives in India prove unsuccessful, management may seek payment through other remedies in the agreement. As of December 31, 2020, the Company recorded an allowance for doubtful accounts of \$3.1 million for this receivable. Management will continue to evaluate the collectability of this receivable as more information becomes available. If the Company's efforts to collect the outstanding balance under the terms of the agreement are not successful, the Company may recognize an additional allowance for all, or substantially all, of the remaining \$14.2 million balance in a future period.

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

	December 31,	
	2020	2019
Balance at beginning of year	\$ 393	\$ 328
Charged to expense	3,833	155
Utilization/write offs/exchange rate differences	(272)	(90)
Balance at end of year	<u>\$ 3,954</u>	<u>\$ 393</u>

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 an increase to accrued and other liabilities. 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.

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

	December 31,	
	2020	2019
Balance at beginning of year	\$ 343	\$ 706
Charged to revenue	1,301	370
Utilization/write offs/exchange rate differences	(1,254)	(733)
Balance at end of year	<u>\$ 390</u>	<u>\$ 343</u>

(i) 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 establishes accruals for estimated losses on adverse purchase commitments as necessary, applying the same lower of cost or net realizable value approach that is used to value inventory.

(j) 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. Realized and unrealized gains and losses on foreign currency transactions are included in other income (expense) in the accompanying consolidated statements of comprehensive income (loss). Our primary exposure to foreign currency exchange rate movements is with our Korea subsidiary, that has a Korean Won functional currency, our Japan subsidiary, that has a Japanese Yen functional currency, and our Germany subsidiary, that has a Euro functional currency.

(k) 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, 2020 and 2019 is comprised of foreign currency translation gains and losses and actuarial gains and losses from the Company's pension liabilities.

(l) 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	2 to 10 years
Computers and software	3 to 5 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.

(m) 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. Factors the Company considers important which could trigger an impairment review, include, but are not limited to, significant changes in the manner of use the 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. 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. 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. 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.

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.

(n) Goodwill and Other Intangible Assets

Goodwill and other acquisition-related intangible assets not subject to amortization are tested annually for impairment and are tested for impairment more frequently if events and circumstances indicate that the asset might be impaired. The quantitative goodwill impairment test is a two-step process with step one requiring the comparison of the reporting unit's estimated fair value with the carrying amount of its net assets. If necessary, step two of the impairment test determines the amount of goodwill impairment to be recorded when the reporting unit's recorded net assets exceed its 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.

(o) 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.

(p) 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 expected term of the awards, 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 Company amortizes the values of the stock-based compensation to expense using the straight-line method. The value of the award is recognized as expense over the requisite service periods in the Company's consolidated statements of comprehensive income (loss). The Company accounts for forfeitures as they occur.

(q) 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.

The Company does not recognize a tax benefit unless it concludes that it is more likely than not that the benefit will be sustained on audit by the taxing authority based solely on the technical merits of the associated tax position. If the recognition threshold is met, the Company recognizes a tax benefit measured at the largest amount of the tax benefit that, in the Company's judgment, is greater than 50 percent likely to be realized. The Company records interest and penalties related to uncertain tax positions in interest expense and in general and administrative expense, respectively.

(r) Net Income (Loss) per Share Attributable to DZS Inc.

Basic net income (loss) per share attributable to DZS Inc. is computed by dividing the net income (loss) attributable to DZS 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 DZS 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 restricted stock units, unvested restricted shares and incremental shares of common stock issuable upon the exercise of stock options.

(s) 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.

(t) Cash and Cash Equivalents

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

(u) Leases

The Company determines if an arrangement is a lease at inception. The Company's lease agreements generally contain lease and non-lease components. Payments under the Company's lease arrangements are primarily fixed. Non-lease components primarily include payments for maintenance and utilities. The Company combines fixed payments for non-lease components with lease payments and account for them together as a single lease component which increases the amount of its lease assets and liabilities.

Lease assets and liabilities are recognized at the present value of the future lease payments at the lease commencement date. The interest rate used to determine the present value of the future lease payments is our incremental borrowing rate, because the interest rate implicit in our leases is not readily determinable. The Company's incremental borrowing rate is estimated to approximate the interest rate on a collateralized basis with similar terms and payments. The Company's lease terms include periods under options to extend the lease when it is reasonably certain that we will exercise that option.

(v) Recent Accounting Pronouncements

In March 2020, the FASB issued ASU No. 2020-04 (Topic 848), *Reference Rate Reform - Facilitation of the Effects of Reference Rate Reform on Financial Reporting*, which provides temporary optional expedients and exceptions to the existing guidance on contract modifications and hedge accounting to ease the financial reporting burdens related to the expected market transition from the London Interbank Offered Rate (LIBOR) and other interbank offered rates to alternative reference rates, such as the Secured Overnight Financing Rate. The standard was effective upon issuance and may generally be applied through December 31, 2022, to any new or amended contracts, hedging relationships, and other transactions that reference LIBOR. The Company is currently evaluating the impact of the transition and disclosure requirements of the standard on its consolidated financial statements.

In December 2019, the FASB issued ASU 2019-12: *Simplifying the Accounting for Income Taxes* (Topic 740), which removes certain exceptions to the general principles in Topic 740 and improves consistent application of and simplifies GAAP for other areas of Topic 740 by clarifying and amending existing guidance. This ASU is effective for fiscal years beginning after December 15, 2020, and interim periods within those fiscal years, with early adoption permitted. The Company is evaluating the effect of adopting this new accounting standard but does not expect adoption to have a material impact on the Company's consolidated financial statements or disclosures.

In November 2019, the FASB issued ASU No. 2019-11, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses*, which clarifies or addresses specific issues about certain aspects of ASU 2016-13. ASU 2019-11 clarifies that to use the practical expedient, entities must reasonably expect the borrower “to continue to replenish the collateral to meet the requirements of the contract.” In addition, if entities have elected the practical expedient (i.e., they reasonably expect the borrower to continue to replenish the collateral to meet the requirements of the contract) and the fair value of the collateral is less than the amortized cost of the financial asset, they should estimate expected credit losses on the portion of the amortized cost basis that is unsecured (i.e., the amount by which the amortized cost basis of the financial asset exceeds the fair value of the collateral). The expected credit loss is limited to the difference between the amortized cost basis of the financial asset and the fair value of the collateral. Effective Dates for entities that have not yet adopted ASU 2016-13, the amendments in ASU 2019-11 are effective on the same date as those in ASU 2016-13. The Company is currently assessing the potential impact of adopting this new guidance on its consolidated financial statements.

In June 2016, FASB issued ASU 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, which requires the Company to measure and recognize expected credit losses for financial assets held and not accounted for at fair value through net income. In November 2018, April 2019 and May 2019, the FASB issued ASU No. 2018-19, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses*, ASU No. 2019-04, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses*, and ASU No. 2019-05, *Financial Instruments - Credit Losses (Topic 326): Targeted Transition Relief*, which provided additional implementation guidance on the previously issued ASU. The updated guidance is effective for the Company on January 1, 2022, and requires a modified retrospective adoption method. Early adoption is permitted. The Company is currently assessing the potential impact of adopting this new guidance on its consolidated financial statements.

(2) Business Combinations

Keymile Acquisition

On January 3, 2019, ZTI Merger Subsidiary III Inc., a Delaware corporation and a wholly owned subsidiary of the Company (“ZTI”), acquired all of the outstanding shares of Keymile GmbH, now DZS GmbH (“Keymile” or “DZS GmbH”), a limited liability company organized under the laws of Germany, from Riverside KM Beteiligung GmbH (“Riverside”), a limited liability company organized under the laws of Germany, pursuant to a share purchase agreement (the “Keymile Acquisition”).

DZS GmbH is a leading solution provider and manufacturer of telecommunication systems for broadband access. The Company believes DZS GmbH 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 and G. Fast technology.

The aggregate cash purchase price paid for all of the shares of Keymile and certain of its subsidiaries, was €10.25 million (approximately \$11.8 million), prior to adjustment for the lockbox mechanism described below. The Company also assumed pension obligations of approximately \$16.2 million. Following the closing of the Keymile Acquisition, Keymile became the Company's wholly owned subsidiary. The Keymile Acquisition agreement also provided for a lockbox mechanism such that normal operations were observed by Keymile management and any excess cash flows generated from operating activities for the period from October 1, 2018 to December 31, 2018 remained with Keymile following the closing, with the Company as the beneficiary, as the purchaser of Keymile. At December 31, 2018, cash received from the lockbox mechanism amounted to \$2.5 million, resulting in a final adjusted acquisition price of \$9.3 million.

On October 1, 2018, as a condition for the Keymile Acquisition, Riverside extended a €4.0 million (\$4.4 million, which represents the cash and cash equivalents and short-term debt, in the "Allocation of Purchase Consideration" table below) working capital loan to Keymile. The working capital loan bore interest at a rate of 3.5% per annum and was repaid during 2019.

A summary of the final estimated purchase price allocation to the fair value of assets acquired and liabilities assumed is as follows (in thousands):

Purchase consideration	
Cash consideration	\$ 11,776
Working capital adjustment: cash received from lockbox mechanism	(2,497)
Adjusted purchase consideration	<u>\$ 9,279</u>

The purchase price allocation resulted in the recognition of goodwill of approximately \$1.0 million. The goodwill was the result of the purchase price paid for the Keymile Acquisition (adjusted for amounts received under the lockbox mechanism) exceeding the fair value of the identifiable net assets acquired.

The following table represents the final estimated fair value and useful lives of identifiable intangible assets acquired:

	Estimated Fair Value (in thousands)	Estimated Useful Life
Intangible assets acquired		
Technology - developed core	\$ 5,040	5 years
Customer relationships	3,632	5 years
Trade name	1,375	5 years
Total intangible assets	<u>\$ 10,047</u>	

(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 were not measured at fair value on the Company's consolidated balance sheets as of December 31, 2020 and 2019, but require disclosure of their fair values: cash and cash equivalents, restricted cash, accounts and other receivables, accounts payable and debt. The carrying values of financial instruments such as cash and cash equivalents, restricted cash, accounts and other receivables 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.

(4) Cash and Cash Equivalents and Restricted Cash

As of December 31, 2020 and 2019, the Company's cash and cash equivalents consisted of financial deposits. Cash and cash equivalents held within the U.S. are held at FDIC insured depository institutions. Cash and cash equivalents held outside the U.S. totaled \$32.2 million and \$15.6 million as of December 31, 2020 and December 31, 2019, respectively. Restricted cash consisted primarily of cash restricted for performance bonds, warranty bonds and collateral for borrowings. Long term restricted cash was \$0.2 million as of December 31, 2020 and December 31, 2019 and is included in other assets on the consolidated balance sheets.

(5) Balance Sheet Detail

Balance sheet detail as of December 31, 2020 and 2019 is as follows (in thousands):

Inventories

	As of December 31,	
	2020	2019
Inventories:		
Raw materials	\$ 16,962	\$ 15,774
Work in process	1,486	1,458
Finished goods	21,124	18,207
	<u>\$ 39,572</u>	<u>\$ 35,439</u>

Inventories provided as collateral for borrowings from Export-Import Bank of Korea amounted to \$9.6 million and \$6.7 million as of December 31, 2020 and 2019, respectively.

Property, plant and equipment

	As of December 31,	
	2020	2019
Property, plant and equipment, net:		
Furniture and fixtures	\$ 10,686	\$ 10,803
Machinery and equipment	5,039	2,550
Leasehold improvements	4,633	4,267
Computers and software	1,883	1,849
Other	716	801
	<u>22,957</u>	<u>20,270</u>
Less: accumulated depreciation and amortization	(15,445)	(13,130)
Less: government grants	(366)	(371)
	<u>\$ 7,146</u>	<u>\$ 6,769</u>

Depreciation expense associated with property, plant and equipment was \$2.2 million and \$2.0 million for the years ended December 31, 2020 and 2019, respectively. Other property, plant and equipment represents land and buildings held and used.

Accrued and other liabilities

	As of December 31,	
	2020	2019
Accrued and other liabilities:		
Accrued warranty	\$ 1,522	\$ 1,611
Accrued compensation	5,692	1,618
Accrued taxes payable	4,736	2,887
Other accrued expenses	4,757	6,848
	<u>\$ 16,707</u>	<u>\$ 12,964</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:

	December 31,	
	2020	2019
Balance at beginning of the year	\$ 1,611	\$ 1,319
Warranty liability assumed from Keymile acquisition	-	230
Charged to cost of revenue	1,072	967
Claims and settlements	(1,189)	(903)
Foreign exchange impact	28	(2)
Balance at end of the year	<u>\$ 1,522</u>	<u>\$ 1,611</u>

Contract Asset

The balance of contract assets, current at December 31, 2020 was \$6.2 million, which decreased from \$16.7 million as of December 31, 2019. The decrease in contract assets by \$10.5 million was primarily due to invoicing that occurred in 2020 from unbilled balances reflected as contracts assets as of December 31, 2019.

Contract Cost

The balance of contract cost deferred at December 31, 2020 and 2019 was \$0.5 million and \$0.1 million, respectively. During the year ended December 31, 2020, the Company recorded \$0.1 million in amortization related to contract cost deferred as of December 31, 2019.

Contract Liability

The balance of contract liabilities, current at December 31, 2020 was \$4.4 million, comprising of products and services contract liability of \$3.1 million and extended warranty contract liability of \$1.3 million. The balance of contract liabilities, current at December 31, 2019 was \$3.6 million.

The balance of contract liabilities, long-term at December 31, 2020 was \$2.5 million, comprising of products and services contract liability of \$0.8 million and extended warranty contract liability of \$1.7 million. The balance of contract liabilities, long-term at December 31, 2019 was \$3.2 million.

During the year ended December 31, 2020, the Company recorded \$3.3 million in net revenue related to contract liabilities as of December 31, 2019.

Accrued Restructuring Costs

The Company established a restructuring plan in September 2019 to further align its business resources based on an analysis of the current business conditions. The Company incurred restructuring and other charges of approximately \$4.9 million for the year ended December 31, 2019, consisting primarily of severance and other termination related benefits of \$3.9 million, and an impairment charge of \$1.0 million related to a right-of-use asset from an operating lease. The following table summarizes the activity related to the accrued restructuring costs (in thousands):

	Severance and Related Benefits
Balance as of December 31, 2018	\$ —
Restructuring charges for the year	3,930
Cash payments	(3,930)
Balance as of December 31, 2019	<u>\$ —</u>

(6) Goodwill and Intangible Assets

Goodwill as of December 31, 2020 and 2019 was as follows (in thousands):

	December 31,	
	2020	2019
Balance at beginning of the year	\$ 3,977	\$ 3,977
Goodwill from Keymile acquisition	—	1,003
Less: Accumulated impairment	—	(1,003)
Balance at end of the year	<u>\$ 3,977</u>	<u>\$ 3,977</u>

The Company recognized no impairment loss for goodwill for the year ended December 31, 2020. During 2019, the Company recorded goodwill of \$1.0 million related to the acquisition of Keymile. In performing the 2019 annual impairment evaluation, utilizing a present value cash flow model to determine the fair value of the reporting unit, the Company determined that the goodwill related to Keymile was impaired, due to the financial performance of the reporting unit. The Company recognized an impairment loss of \$1.0 million on goodwill for the year ended December 31, 2019. The accumulated impairment of goodwill was \$1.0 million as of December 31, 2020 and 2019, respectively.

Intangible assets as of December 31, 2020 and 2019 were as follows (in thousands):

	As of December 31, 2020		
	Gross Carrying Amount	Accumulated Amortization	Net
Developed technology	\$ 3,060	\$ (2,652)	\$ 408
Customer relationships	5,240	(2,271)	2,969
Total intangible assets, net	<u>\$ 8,300</u>	<u>\$ (4,923)</u>	<u>\$ 3,377</u>

	As of December 31, 2019		
	Gross Carrying Amount	Accumulated Amortization	Net
Developed technology	\$ 7,994	\$ (3,027)	\$ 4,967
Customer relationships	8,795	(2,458)	6,337
Trade name	1,346	(269)	1,077
Total intangible assets, net	<u>\$ 18,135</u>	<u>\$ (5,754)</u>	<u>\$ 12,381</u>

The Company performed an impairment evaluation, following a triggering event for potential impairment, utilizing a present value cash flow model to determine the fair value of the intangible assets, the Company determined that the intangible assets related to DZS GmbH were impaired, due to the financial performance of the reporting unit and loss of a significant customer. The Company recorded impairment expense of \$6.5 million for DZS GmbH intangible assets during the year ended December 31, 2020. The impairment expense was comprised of \$3.3 million for developed technology, \$2.3 million for customer relationships, and \$0.9 million for trade names, respectively. During 2019, the Company recorded \$5.0 million, \$3.6 million and \$1.4 million in developed technology, customer relationships and trade names, respectively, related to the acquisition of Keymile. Refer to Note 2 Business Combinations, for further detail.

	December 31,	
	2020	2019
Balance at beginning of the year	\$ 12,381	\$ 5,649
Intangible assets from Keymile acquisition	—	10,047
Less: Impairment of Keymile acquisition intangible assets	(6,472)	—
Less: Amortization expense	(2,959)	(3,103)
Foreign exchange impact	427	(212)
Balance at end of the year	<u>\$ 3,377</u>	<u>\$ 12,381</u>

Amortization expense associated with intangible assets for the years ended December 31, 2020 and 2019 amounted to \$3.0 million, and \$3.1 million, respectively. As of December 31, 2020, expected future amortization expense for the years indicated was as follows (in thousands):

Period	Expected Amortization Expense
2021	\$ 932
2022	524
2023	524
2024	524
2025	524
Thereafter	349
Total	<u>\$ 3,377</u>

(7) Debt

The following tables summarize the Company's debt (in thousands):

	As of December 31, 2020		
	Short-term	Long-term	Total
Bank and Trade Facilities - Foreign Operations	13,787	—	13,787
Related party	—	29,766	29,766
	<u>13,787</u>	<u>29,766</u>	<u>43,553</u>
Less: unamortized deferred financing costs on the March 2020 DNI Loan	—	(12)	(12)
	<u>\$ 13,787</u>	<u>\$ 29,754</u>	<u>\$ 43,541</u>

	As of December 31, 2019		
	Short-term	Long-term	Total
PNC Credit Facilities	\$ 2,500	\$ 10,625	\$ 13,125
Bank and Trade Facilities - Foreign Operations	15,779	—	15,779
Related party	—	9,096	9,096
	<u>18,279</u>	<u>19,721</u>	<u>38,000</u>
Less: unamortized deferred financing costs on the PNC Bank Facility	(795)	(688)	(1,483)
	<u>\$ 17,484</u>	<u>\$ 19,033</u>	<u>\$ 36,517</u>

Deferred financing costs are amortized over the term of the debt on the effective interest rate method.

The future principal maturities of our debt for each of the next five years are as follows (in thousands):

Year ended December 31,

2021	\$ 13,787
2022	29,766
2023	—
2024	—
2025	—
Thereafter	—
Total	<u>\$ 43,553</u>

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, 2020 and 2019, the Company had an aggregate outstanding balance of \$13.8 million and \$15.8 million, respectively, under such financing arrangements. The weighted average borrowing rate as of December 31, 2020 and 2019, were 1.8% and 2.7%, respectively. The maturity date and interest rates per annum applicable to outstanding borrowings under these financing arrangements were as listed in the tables below (amounts in thousands).

		As of December 31, 2020			
		Maturity Date	Denomination	Interest rate (%)	Amount
The Export-Import Bank of Korea	Export development loan	5/24/2021	KRW	1.99	7,353
Korea Development Bank	General loan	8/10/2021	KRW	2.28	4,596
LGUPlus	General loan	6/17/2021	KRW	0.00	1,838
					<u>\$13,787</u>

		As of December 31, 2019			
		Maturity Date	Denomination	Interest rate (%)	Amount
NongHyup Bank	Credit facility	09/30/2020	USD	3.50 ~ 4.50	\$ 2,091
The Export-Import Bank of Korea	Export development loan	07/01/2020	KRW	2.75	5,182
Korea Development Bank	General loan	08/08/2020	KRW	3.00	4,319
Korea Development Bank	Credit facility	08/07/2020	USD	3.00 ~ 3.15	2,460
LGUPlus	General loan	06/17/2020	KRW	0.00	1,727
					<u>\$15,779</u>

As of December 31, 2020 and 2019, the Company had \$19.0 million of borrowing capacity under credit facilities with certain foreign banks and had no outstanding borrowings under these credit facilities as of December 31, 2020 compared to \$4.6 million outstanding as of December 31, 2019. As of December 31, 2020, no amounts were committed as security for letters of credit under the Company's credit facilities with certain foreign banks compared to \$0.8 million as of December 31, 2019. As of December 31, 2020 and December 31, 2019, the Company had \$19.0 million and \$14.4 million, respectively, available under its credit facilities.

On June 1, 2020, DZS Japan entered into an assignment agreement with JECC Corporation to factor JPY 1,258,822,828 (approximately \$11.7 million USD) of accounts receivables from Softbank. JECC assessed a discount equivalent to JPY 5,964,328 (approximately \$0.05 million USD) or approximately 0.474% of the amount factored, with a stated factoring rate of 1.575% based on the days remaining from factoring to expected receivable collection. DZS Japan received JPY 1,252,858,500 (approximately \$11.65 million USD) on June 19, 2020. We concluded that the factoring agreement did not meet the requirements of ASC 860-10-40-5, to be accounted for as a sale. Therefore, the arrangement was accounted for as a secured borrowing. There was no remaining balance outstanding as of December 31, 2020.

Related Party Debt

In February 2016, DNS California borrowed \$1.8 million from DNI for capital investment with an interest rate of 4.6% per annum, payable annually. 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, the Company 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, in connection with the entry into the PNC Credit Facilities, the Company amended the terms of this loan to extend the repayment date until May 27, 2022. As of December 31, 2020 and 2019, \$1.8 million was outstanding.

In September 2016, the Company entered into a loan agreement with DNI for a \$5.0 million unsecured subordinated term loan facility. The interest rate under this facility was 4.6% per annum. In February 2019, the entire outstanding balance on this term loan was repaid with some of the proceeds of the PNC Credit Facilities.

In March 2018, DNS Korea borrowed KRW 6.5 billion (\$5.8 million USD) from DNI of which KRW 5.0 billion (\$4.5 million USD) was repaid on August 8, 2018. The loan bears interest at a rate of 4.6%, and is secured by certain accounts receivable of DNS Korea. In February 2019, in connection with the entry into the PNC Credit Facilities, the Company amended the terms of this loan to extend the repayment date until May 27, 2022. As of December 31, 2020 and 2019, KRW 1.5 billion (\$1.4 million USD) and KRW 1.5 billion (\$1.3 million) was outstanding, respectively.

In December 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 May 27, 2022. As of December 31, 2020 and 2019, \$6.0 million was outstanding.

The modifications resulting from the amendments described in the four preceding paragraphs were limited to the extension of the maturity dates and removal of the collateral on the outstanding term loans with DNI. There were no fees paid to DNI or external costs otherwise incurred in connection with these modifications.

On March 5, 2020, DNS Korea, the Company's wholly-owned, indirect subsidiary entered into a Loan Agreement with DNI (the "March 2020 DNI Loan"). The March 2020 DNI Loan was negotiated and approved on behalf of the Company and its subsidiaries by a special committee of the Board of Directors of the Company (the "Special Committee") consisting of directors determined to be independent from DNI. The March 2020 DNI Loan consists of a term loan in the amount of KRW 22.4 billion (\$18.5 million USD), with interest payable semi-annually at an annual rate of 4.6% and maturing on March 11, 2022. No principal payments are due on the March 2020 DNI Loan until the maturity date, but DNS Korea may prepay the loan, or a portion thereof, without penalty. As of December 31, 2020, KRW 22.4 billion (\$20.6 million USD) was outstanding.

As security for the March 2020 DNI Loan (and other existing loans between DNI and DNS Korea and/or DNS California), (i) DNS California, a wholly-owned, direct subsidiary of the Company and the sole stockholder of DNS Korea, agreed to pledge the outstanding shares of DNS Korea to DNI and (ii) DNS Korea granted a security interest in its personal property assets, accounts receivable and intellectual property assets to DNI. The March 2020 DNI Loan includes certain covenants consisting of financial reporting obligations, a maintenance covenant whereby DNS Korea agreed to maintain a minimum stockholders' equity value in an amount equal to or greater than KRW 43.3 billion (\$35.8 million), and customary events of default. If an event of default occurs and is not remedied within the applicable cure period, DNI will be entitled to take various actions, including requiring the immediate repayment of all outstanding amounts under the March 2020 DNI Loan and selling the shares or assets of DNS Korea.

DNS Korea loaned the funds borrowed under the March 2020 DNI Loan to the Company, and the Company used a portion of such funds to repay in full and terminate the PNC Credit Facilities, described below.

For the year ended December 31, 2020 and 2019, interest expense on these related party borrowings was \$1.0 million and \$0.4 million, respectively. As of December 31, 2020, the Company had \$29.8 million in outstanding borrowings from DNI, which consisted of the March 2020 DNI Loan of KRW 22.4 billion (\$20.6 million USD), the December 2018 DNI unsecured subordinated term loan facility of \$6.0 million, the February 2016 DNI capital investment of \$1.8 million, and the March 2018 DNI secured loan of KRW 1.5 billion (\$1.4 million).

In February 2021, the Company paid off the entire outstanding balance of debt with related parties with proceeds of its issuance of shares of its common stock during January 2021. See Note 17 to the consolidated financial statements for additional information.

PNC Credit Facilities

In February 2019, the Company and ZTI (collectively, the "Borrowers"), and certain direct and indirect subsidiaries of the Borrowers, as guarantors, entered into a Revolving Credit, Term Loan, Guaranty and Security Agreement (the "Domestic Credit Agreement") and an 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") and Citibank, N.A. as lenders, and PNC as agent for the lenders (the "PNC Credit Facilities"), which replaced the Company's former senior secured credit facilities with Wells Fargo Bank (the "Former WFB Facility"). Such transactions and the agreements referenced above are referred to as the "PNC Credit Facilities."

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

The Company used a portion of the funds borrowed from the term loan under the PNC Credit Facilities to (i) repay \$5.0 million of 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 collateralize \$3.6 million in outstanding letters of credit under the Former WFB Facility, and (iii) repay \$5.6 million in short-term debt in Korea and Japan. The Company's obligations under the PNC Credit Facilities were secured by substantially all of the personal property assets of the Company and its subsidiaries that were co-borrowers or guarantors under the PNC Credit Facilities, including their intellectual property.

The PNC Credit Facilities had a three-year term and were scheduled to mature on February 27, 2022. The PNC Credit Facilities contemplated repayment of the term loan in quarterly installments over the term of the loan, with the balance of the term loan and revolving line of credit due at maturity.

In July 2019, \$4.4 million in outstanding borrowings under the revolving line of credit (which represented all outstanding borrowings under the revolving line of credit) was repaid in full and in March 2020, the Company paid the outstanding term loan borrowings in full and terminated the PNC Credit Facilities. In association with this debt repayment, the Company recorded a loss on extinguishment of debt of \$1.4 million during the year ended December 31, 2020.

Former WFB Facility

In July 2018, the Company entered into the Amended and Restated Domestic Credit Agreement and the Amended and Restated Ex-Im Credit Agreement with Wells Fargo. The Company had a \$25.0 million revolving line of credit facility (including up to \$5.0 million in letters of credit) under the Former WFB Facility. The amounts borrowed under the Former WFB Facility bore 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 Former WFB Facility.

In February 2019, the Company repaid \$1.5 million outstanding borrowings under the revolving line of credit plus accrued interest and fees and cash collateralized \$3.6 million in outstanding letters of credit under the Former WFB Facility with some of the proceeds of the PNC Credit Facilities and terminated the Former WFB Facility.

Working Capital Loan

On October 1, 2018, as a condition for the Keymile Acquisition, Riverside, the former stockholder of Keymile, extended a €4.0 million (\$4.4 million) working capital loan to Keymile. The working capital loan bore interest at a rate of 3.5% per annum and was repaid during 2019.

(8) Stockholders' Equity

Changes in Accumulated Other Comprehensive Income (Loss)

The table below summarizes the changes in accumulated other comprehensive income (loss) by component, net of tax (in thousands):

	December 31,	
	2020	2019
Beginning accumulated other comprehensive income	\$ (3,939)	\$ (192)
Actuarial loss for pension plan	(981)	(1,793)
Foreign currency translation adjustments, net	2,796	(1,939)
Non-controlling interest	-	(15)
Ending accumulated other comprehensive income	<u>\$ (2,124)</u>	<u>\$ (3,939)</u>

Foreign currency translation adjustments are presented net of tax of \$0.7 million and \$0.5 million, for the years ended December 31, 2020 and 2019, respectively.

Stock-based Compensation

As of December 31, 2020, the Company has one 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 plan related to employee stock purchases.

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

	Years ended December 31,	
	2020	2019
Cost of revenue	\$ 86	\$ 41
Research and product development	395	267
Selling, marketing, general and administrative	4,132	3,200
	<u>\$ 4,613</u>	<u>\$ 3,508</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.

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 to ten 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 prior 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, 2020 was 856,769 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 the historical volatility of the Company and the risk-free interest rate was based on the 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.

Stock Options

The weighted average assumptions used to value option grants for the year ended December 31, 2020 and 2019 are as follows:

	Years ended December 31,	
	2020	2019
Expected term (years)	6.2	5.9
Volatility	60.5%	65.7%
Risk free interest rate	0.4%	2.0%

The weighted average grant date fair value of options granted during the years ended December 31, 2020 and 2019 were \$5.40 and \$7.22, respectively.

The following table sets forth the summary of option activity under the stock option program for the year ended December 31, 2020 (in thousands, except per share data):

	Options Outstanding	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
Outstanding as of December 31, 2019	2,012	\$ 8.47		
Granted	1,112	9.77		
Canceled/Forfeited	(258)	10.32		
Expired	(133)	9.91		
Exercised	(400)	7.47		
Outstanding as of December 31, 2020	2,333	8.97	7.30	\$ 15,158
Vested and exercisable at December 31, 2020	864	\$ 7.68	3.96	\$ 6,736

The aggregate intrinsic value represents the total pretax intrinsic value, based on the Company's closing stock price as of December 31, 2020 of \$15.47 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, 2020 and 2019 were \$1.9 million and \$0.2 million, respectively.

As of December 31, 2020, there was \$11.8 million of unrecognized compensation costs which are recognized over a weighted average period of three years.

The following table sets forth the summary of option activity under the stock option program for the year ended December 31, 2019 (in thousands, except per share data):

	Options Outstanding	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
Outstanding as of December 31, 2018	1,744	\$ 8.00		
Granted	470	10.36		
Canceled/Forfeited	(128)	9.83		
Expired	(39)	8.32		
Exercised	(35)	6.22		
Outstanding as of December 31, 2019	2,012	8.47	7.36	\$ 2,418
Vested and exercisable at December 31, 2019	946	\$ 7.47	5.74	\$ 1,684

Restricted Stock Units

The following table sets forth the summary of restricted stock unit awards activity under the stock award program for the year ended December 31, 2020 (in thousands, except per share data):

	RSU Outstanding	Weighted Average Grant Date Fair Value
Non-vested as of December 31, 2019	11	\$ 10.05
Granted	472	10.49
Canceled/Forfeited	(10)	10.63
Vested	(57)	9.26
Non-vested as of December 31, 2020	416	10.65

The following table sets forth the summary of restricted stock unit awards activity under the stock award program for the year ended December 31, 2019 (in thousands, except per share data):

	RSU Outstanding	Weighted Average Grant Date Fair Value
Non-vested as of December 31, 2018	4	\$ 7.50
Granted	40	12.77
Vested	(33)	13.11
Non-vested as of December 31, 2019	<u>11</u>	<u>10.05</u>

Total grant-date fair value of awards granted during the years ended December 31, 2020 and 2019 was \$4.9 million and \$0.5 million, respectively. Total fair value of awards vested during the years ended December 31, 2020 and 2019 was \$0.5 million and \$0.4 million, 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 weighted average assumptions used to value the ESPP shares for the year ended December 31, 2020 included an expected term of 0.5 years, volatility of 85.3% and a risk free interest rate of 0.5%. The Company recorded \$0.3 million and \$0.1 million of expense related to the ESPP for the year ended December 31, 2020 and 2019, respectively.

(9) 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,	
	2020	2019
Numerator:		
Net income (loss) attributable to DZS Inc.	\$ (23,082)	(13,457)
Denominator:		
Weighted average number of shares outstanding:		
Basic	21,588	19,403
Effect of dilutive securities:		
Stock options, restricted stock units and share awards	—	—
Diluted	<u>21,588</u>	<u>19,403</u>
Net income (loss) per share attributable to DZS Inc.:		
Basic	\$ (1.07)	\$ (0.69)
Diluted	<u>\$ (1.07)</u>	<u>\$ (0.69)</u>

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):

	2020	2019
Outstanding stock options	2,333	2,012
Unvested restricted stock units	416	11

As of December 31, 2020 and 2019, no shares of issued common stock were subject to repurchase.

(10) Income Taxes

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

	Years ended December 31,	
	2020	2019
Loss before income taxes - Domestic	\$ (19,276)	\$ (11,069)
Income (loss) before income taxes - Foreign	(305)	1,391
Income (loss) before income taxes	<u>\$ (19,581)</u>	<u>\$ (9,678)</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,	
	2020	2019
Current:		
Federal	\$ -	\$ -
State	28	16
Foreign	3,256	2,439
Total current tax provision	<u>\$ 3,284</u>	<u>\$ 2,455</u>
Deferred:		
Federal	\$ -	\$ -
State	-	-
Foreign	217	1,130
Total deferred tax provision (benefit)	<u>\$ 217</u>	<u>\$ 1,130</u>
Total tax provision (benefit)	<u>\$ 3,501</u>	<u>\$ 3,585</u>

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

	Years ended December 31,	
	2020	2019
Expected tax provision (benefit) at statutory rate	\$ (4,112)	\$ (2,032)
State taxes, net of Federal effect	22	13
State change in deferreds	(325)	1,927
Foreign taxes	3,472	3,569
Foreign rate differential	(65)	(818)
Valuation allowance	2,550	557
Permanent differences	1,950	544
Tax credit carryforwards	(202)	(212)
Miscellaneous	211	37
Total tax provision	<u>\$ 3,501</u>	<u>\$ 3,585</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, 2020 and 2019 are as follows (in thousands):

	As of December 31,	
	2020	2019
Deferred tax assets:		
Net operating loss, capital loss, and tax credit carryforwards	\$ 24,071	\$ 23,195
Fixed assets and intangible assets	2,689	1,057
Inventory and other reserves	1,554	1,368
Operating lease liability	1,725	1,684
Other (mainly accrued expenses)	4,792	2,552
Gross deferred tax assets	34,831	29,856
Less valuation allowance	(31,994)	(26,827)
Deferred tax liabilities:		
Operating lease right-of-use-asset	(1,432)	(1,407)
Gross deferred tax liabilities	(1,432)	(1,407)
Total net deferred tax assets	<u>\$ 1,405</u>	<u>\$ 1,622</u>

For the years ended December 31, 2020 and 2019, the net changes in the valuation allowance were an increase of \$5.2 million, and an increase of \$11.5 million, respectively. The increase during the current year is mainly due to the increase of U.S. net deferred tax assets. The Company maintains a valuation allowance on its U.S. and Germany 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, 2020, the Company had net operating loss carryforwards for federal and state income tax purposes of approximately \$41.1 million and \$30.4 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 2021. The federal net operating loss carryforward includes \$15.7 million that has an indefinite carryforward period. As of December 31, 2020, the Company had net operating losses for German tax purposes of approximately \$11.0 million, which do not expire and are carried forward indefinitely.

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. In addition, some of the pre-acquisition NOLs have written off due to the limitation.

As of December 31, 2020, the Company had research credit carryforwards of approximately \$1.5 million and \$2.0 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.

The Company does not intend to distribute the earnings from its foreign subsidiaries and has not recorded any deferred taxes related to such amounts. The Company considers the remaining excess of the amount for financial reporting over the tax basis of our investments in our foreign subsidiaries to be indefinitely reinvested and the determination of any deferred tax liability on this amount is not practicable.

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, 2020, the Company had gross unrecognized tax benefits of \$1.3 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 2020 and 2019 are as follows (in thousands):

	December 31,	
	2020	2019
Balance at beginning of the year	\$ 1,036	\$ 807
Increases related to current year tax positions	219	229
Balance at end of the year	<u>\$ 1,255</u>	<u>\$ 1,036</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 or penalty (benefit) provision during the years ended December 31, 2020 and 2019.

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	2017 - 2020
California and Canada	2016 - 2020
Brazil	2015 - 2020
Germany	2016 - 2020
Japan	2015 - 2020
Korea	2018 - 2020
United Kingdom	2017 - 2020
Vietnam	2018 - 2020

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.

(11) Non-Controlling Interests

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

	<u>December 31,</u> <u>2019</u>
Beginning non-controlling interests	\$ 615
Net income attributable to non-controlling interest	194
Foreign currency translation adjustments (Other comprehensive income)	15
Purchase of non-controlling interest in DNS Japan	(824)
Ending non-controlling interests	<u>\$ —</u>

Acquisition of the Non-Controlling Interest in DNS Japan

On July 31, 2019, the Company acquired the remaining 30.94% non-controlling interest of DNS Japan, and DNS Japan (now DZS Japan, Inc.) became a wholly owned subsidiary of the Company. The Company acquired the remaining interest in DNS Japan for total cash consideration of \$1.0 million, consisting entirely of payments to the former shareholder (Handysoft). This transaction resulted in a decrease to additional paid-in capital of \$0.1 million, a decrease to non-controlling interest of \$0.8 million, and a total impact of \$1.0 million in the consolidated statements of stockholders' equity and non-controlling interest.

(12) Related Party Transactions

Related Party Debt

As of December 31, 2020 and 2019, the Company had \$29.8 million and \$9.1 million, respectively, outstanding from related party borrowings from DNI.

See Note 7 Debt – Related Party Debt for further information about the Company's related party debt.

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, 2020 and 2019 were as follows (in thousands):

Counterparty	DNI direct ownership interest	For the year ended December 31, 2020						
		Sales	Cost of revenue	Manufacturing** (Cost of revenue)	Research and product development	Selling, marketing, general and administrative	Interest expense	Other Expenses
DNI	N/A	\$ 4,362	\$ 3,608	\$ —	\$ —	\$ 2,767	\$ 1,047	\$ 355
DASAN Invest*	N/A	—	—	22	100	42	—	—
		<u>\$ 4,362</u>	<u>\$ 3,608</u>	<u>\$ 22</u>	<u>\$ 100</u>	<u>\$ 2,809</u>	<u>\$ 1,047</u>	<u>\$ 355</u>

* Dasan Invest holds 19.79% of DNI's shares

Counterparty	DNI direct ownership interest	For the year ended December 31, 2019						
		Sales	Cost of revenue	Manufacturing** (Cost of revenue)	Research and product development	Selling, marketing, general and administrative	Interest expense	Other Expenses
DNI	N/A	\$ 2,471	\$ 1,825	—	—	\$ 3,768	\$ 459	\$ 341
Tomato Soft Ltd.	100%	—	—	117	—	—	—	—
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	526	—	—	—
CHASAN Networks Co., Ltd.	100%	—	—	1,103	71	—	—	—
J-Mobile Corporation	91.50%	42	81	—	—	—	—	—
		<u>\$ 2,513</u>	<u>\$ 1,906</u>	<u>\$ 1,220</u>	<u>\$ 597</u>	<u>\$ 3,768</u>	<u>\$ 459</u>	<u>\$ 341</u>

**Manufacturing costs represent product purchases from and manufacturing activities performed by related parties, and are included in Cost of revenue on the consolidated statements of comprehensive (loss) income.

The Company has entered into sales agreements with DNI and certain of its subsidiaries. Sales and cost of revenue to DNI and J-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.

On September 9, 2016, DZS acquired DNS California, through the merger of a wholly owned subsidiary of Zhone Technologies, Inc. with and into DNS California, with DNS California surviving as our wholly owned subsidiary (the "Merger"). Prior to the Merger, as DNS California was then a wholly owned subsidiary of DNI, DNI had sales agreements with certain customers on DNS California's 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.

Prior to the Merger, DNS California, 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 shared administrative services.

DNS Korea entered into two separate sublease agreements with DNI. In April 2018, DNS Korea entered into a lease agreement for approximately 73,000 square feet of office space in Pangyo, Korea. The office lease has a term of 7 years and expired in June 2025. In July 2017, the Company entered into a lease agreement for approximately 155,800 square feet of warehouse space in Janghowon, Korea. The warehouse lease has a term of 10 years and expires in June 2027. Operating lease cost related to these leases totaled \$1.7 million and \$1.8 million, for year ended December 31, 2020 and 2019, respectively. As of December 31, 2020, the right of use asset and operating lease liability related to these leases were \$8.6 million and \$8.6 million, respectively. As of December 31, 2019, the right of use asset and operating lease liability related to these leases were \$9.5 million and \$9.5 million, respectively. As of December 31, 2020 and 2019, the discount rate on these leases were 4.0% and 4.0%, respectively.

The Company has entered into an agreement with Dasan Invest to provide IT services for the Company.

The Company has entered into an agreement with Tomato Soft Ltd., a wholly owned subsidiary of DNI, to provide manufacturing services for the Company. Tomato Soft Ltd. ceased being a related party during 2020.

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 \$0.7 million for the development of certain deliverables. Tomato Soft (Xi'an) Ltd. ceased being a related party during 2020.

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.

Interest expenses represent interest expenses to DNI for the related party debt. Refer to Note 7 Debt for more details about the related party debt.

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. Refer to Note 14 Commitments and Contingencies for more details about obligations guaranteed by DNI.

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, 2020 and 2019 were as follows (in thousands):

Counterparty	DNI Ownership Interest	As of December 31, 2020					Accounts payable	Accrued an d other liabilities
		Account Receivables	Other receivables	Deposits for lease**	Loans payable			
DNI	N/A	\$ 2,278	\$ 247	\$ 755	\$ 29,754	\$ 1,552	\$ —	
Dasan Invest*		—	—	—	—	32	—	
		<u>\$ 2,278</u>	<u>\$ 247</u>	<u>\$ 755</u>	<u>\$ 29,754</u>	<u>\$ 1,584</u>	<u>\$ —</u>	

* Dasan Invest holds 19.79% of DNI's shares

Counterparty	DNI Ownership Interest	As of December 31, 2019					Accounts payable	Accrued and other liabilities
		Account Receivables	Other receivables	Deposits for lease**	Loan Payable			
DNI	N/A	—	\$ 32	\$ 709	\$ 9,096	\$ 1,475	\$ 119	
Tomato Soft Ltd.	100%	—	—	—	—	10	—	
Tomato Soft (Xi'an) Ltd.	100%	—	—	—	—	45	—	
Chasan Networks Co., Ltd.	100%	—	—	—	—	96	—	
		<u>\$ —</u>	<u>\$ 32</u>	<u>\$ 709</u>	<u>\$ 9,096</u>	<u>\$ 1,626</u>	<u>\$ 119</u>	

The related party receivables and payables balances are reflected in the respective balance sheet captions noted in the table headers above, other than:

** Deposits for lease are included in other assets in the consolidated balance sheets as of December 31, 2020 and 2019.

(13) Leases

The Company leases certain properties and buildings (including manufacturing facilities, warehouses, and office spaces) and equipment under various arrangements which provide the right to use the underlying asset and require lease payments for the lease term. The Company's lease portfolio consists of operating leases which expire at various dates through 2027.

The Company determines if an arrangement contains a lease at inception. The Company evaluates each service contract upon inception to determine whether it is, or contains, a lease. Such determination is made by applying judgment in evaluating each service contract within the context of the 5-step decision making process under ASC 842. The key concepts of the 5-step decision making process that the Company evaluated can be summarized as: (1) is there an identified physical asset; (2) does the Company have the right to substantially all the economic benefits from the asset throughout the contract period; (3) does the

Company control how and for what purpose the asset is used; (4) does the Company operate the asset; and (5) did the Company design the asset in a way that predetermines how it will be used.

Assets and liabilities related to operating leases are included in the consolidated balance sheets as right-of-use assets from operating leases, operating lease liabilities - current and operating lease liabilities - non-current.

Operating lease right-of-use assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. Many of the Company's lease agreements contain renewal options; however, the Company does not recognize right-of-use assets or lease liabilities for renewal periods unless it is determined that the Company is reasonably certain of renewing the lease at inception or when a triggering event occurs. Some of the Company's lease agreements contain rent escalation clauses, rent holidays, capital improvement funding or other lease concessions.

The Company recognizes minimum rental expense on a straight-line basis based on the fixed components of a lease arrangement. The Company amortizes this expense over the term of the lease beginning with the date of initial possession, which is the date lessor makes an underlying asset available for use. Variable lease components represent amounts that are not fixed in nature, are not tied to an index or rate, and are recognized as incurred.

In determining its right-of-use assets and lease liabilities, the Company applies a discount rate to the minimum lease payments within each lease agreement. ASC 842 requires the Company to use the rate of interest that a lessee would have to pay to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment. The Company determines the incremental borrowing rate for each lease based primarily on its lease term and the economic environment of the applicable country or region.

For the measurement and classification of its lease agreements, the Company groups lease and non-lease components into a single lease component for all underlying asset classes. Variable lease payments include payments for non-lease components of maintenance costs. The components of lease expense were as follows for the years ended December 31, 2020 and December 31, 2019:

	Year ended December 31, 2020 (in thousands)		Year ended December 31, 2019 (in thousands)
Operating lease cost	5,393	\$	5,212
Short-term lease cost	264		404
Total net lease cost	<u>\$ 5,657</u>	<u>\$</u>	<u>5,616</u>

Variable lease cost was not significant for the years ended December 31, 2020 and December 31, 2019.

Supplemental cash flow information related to the Company's operating leases was as follows for the years ended December 31, 2020 and December 31, 2019:

	Year ended December 31, 2020 (in thousands)		Year ended December 31, 2019 (in thousands)
Operating cash flows from operating leases	5,307	\$	4,932
ROU assets obtained in exchange for operating lease obligations	1,405	\$	3,812

The following table presents the lease balances within the Company's consolidated balance sheets, weighted average remaining lease term, and weighted average discount rates related to the Company's operating leases as of December 31, 2020 and December 31, 2019 (in thousands):

Lease Assets and Liabilities

Assets:

Right-of-use assets from operating leases	<u>\$ 18,483</u>	<u>\$</u>	<u>20,469</u>
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Liabilities:

Operating lease liabilities - current	\$ 4,494	\$	4,201
Operating lease liabilities - non-current	15,959		18,154
Total operating lease liabilities	<u>\$ 20,453</u>	<u>\$</u>	<u>22,355</u>

Weighted average remaining lease term	4.6 years		5.5 years
Weighted average discount rate	5.7%		5.5%

The following table presents the maturity of the Company's operating lease liabilities as of December 31, 2020 (in thousands):

	Minimum Future Lease Payments
Year ending December 31:	
2021	5,489
2022	5,075
2023	4,627
2024	4,124
2025	2,311
Thereafter	1,549
Total operating lease payments	23,175
Less: imputed interest	(2,722)
Total minimum lease payments	<u>\$ 20,453</u>

(14) Commitments and Contingencies

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, 2020, the Company had \$6.7 million of surety bonds guaranteed by third parties.

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. However, the Company has agreements with various contract manufacturers which include non-cancellable inventory purchase commitments. The amount of non-cancellable purchase commitments outstanding was \$8.0 million as of December 31, 2020.

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, 2020 that have been provided by third parties and DNI. DNI owns approximately 43.2% 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	\$ 8,400	Letter of Credit from Industrial Bank of Korea
DNI	2,206	Purchasing Card from Industrial Bank of Korea
DNI	323	Bank Guarantee from Industrial Bank of Korea
DNI	8,400	Letter of Credit from Korea Development Bank
DNI	5,515	Borrowings from Korea Development Bank
DNI	6,000	Letter of Credit from NongHyup Bank
DNI	6,147	Borrowings from Export-Import Bank of Korea
DNI	3,000	Payment Guarantee from Shinhan Bank
DNI	1,765	Purchasing Card from Shinhan Bank
Seoul Guarantee Insurance Co.	3,925	Performance Bond, Warranty Bond, etc. (*)
Woori Bank	2,500	Bank Guarantee
PNC	4,732	Collateral for Standby Letter of Credit
Citibank	291	Collateral for Standby Letter of Credit
Shinhan Bank Vietnam	9	Product quality assurance guarantee
Shinhan Bank Vietnam	48	Product quality assurance guarantee for VINITIS
	<u>\$ 53,261</u>	

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

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, results of operations or cash flows. 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 and cash flows of the reporting period in which the ruling occurs, or future periods.

(15) 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 Company made no discretionary contributions to the plan in 2020 or 2019.

The Company 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. For each of the years ended December 31, 2020 and 2019, the Company recorded an expense of \$1.3 million for the plan.

Pension Plans

The Company sponsors defined benefit plans for its employees in Keymile and Japan. Defined benefit plans provide pension benefits based on compensation and years of service.

The net periodic benefit cost related to the plans consisted of the following components during the years ended December 31, 2020 and 2019 (in thousands):

	Year Ended December 31, 2020	Year Ended December 31, 2019
Net Periodic Benefit Cost		
Service Cost	\$ 95	\$ 219
Interest Cost	170	265
Net amortization of net gain (loss)	21	-
Net periodic benefit cost	286	484
Net loss	981	1,793
Prior service cost	-	-
Amortization of prior service cost	-	-
Total recognized in OCI	981	1,793
Total recognized in net periodic benefit cost & OCI	<u>\$ 1,267</u>	<u>\$ 2,277</u>

The service cost component of net benefit cost is presented within cost of revenue or selling, marketing, general and administrative expense on the accompanying consolidated statements of comprehensive income (loss), in accordance with where compensation cost for the related associate is reported. All other components of net benefit cost, including interest cost and net amortization noted above, are presented within other income/expense, net in the accompanying consolidated statements of comprehensive income (loss).

The following provides a reconciliation of the changes in benefit obligation, and the funded status at the end of the year (in thousands):

	Year Ended December 31, 2020	Year Ended December 31, 2019
Benefit obligation, January 1	\$ 17,671	\$ —
Assumed with acquisition	—	16,191
Service cost	95	219
Interest cost	191	265
Benefits paid	(568)	(456)
Actuarial losses	981	1,793
Foreign exchange impact	1,682	(341)
Benefit obligation, December 31	20,052	17,671
Underfunded status, December 31	<u>\$ 20,052</u>	<u>\$ 17,671</u>

The vested benefit obligation of the plan is the same as the accumulated benefit obligation of the plan as all participants are vested and the plan is closed.

The Company has recorded the 2020 and 2019 underfunded status as a long-term liability on the consolidated balance sheets. The accumulated benefit obligation for the plans were \$20.1 million and \$17.7 million as of December 31, 2020 and 2019, respectively. The Company has life insurance contracts, with the Company as beneficiary, in the amount of \$3.5 million and \$3.3 million as of December 31, 2020 and 2019, respectively, related to individuals under the pension plans. Under the investment method, the Company records these insurance contracts based on their cash surrender value at the balance sheet dates. These insurance contracts are classified as other assets on the Company's consolidated balance sheets. The Company intends to use any proceeds from these policies to fund the pension plans. However, since the Company is the beneficiary on these policies, these assets have not been designated pension plan assets.

The estimated net loss and prior service cost for the plans that will be amortized from accumulated other comprehensive loss into net periodic benefit cost over the next fiscal year is not significant. The Company expects to make no contributions to the plans in 2021.

The following benefit payments, which reflect expected future service, are expected to be paid (in thousands):

Years Ending December 31,	
2021	\$ 627
2022	659
2023	694
2024	675
2025	696
2026 - 2029	\$ 3,682

The following gross amounts are recognized net of tax in accumulated other comprehensive loss:

	Year Ended December 31, 2020	Year Ended December 31, 2019
Prior service cost	\$ —	\$ —
Net loss	981	1,793
Net periodic benefit cost	<u>\$ 981</u>	<u>\$ 1,793</u>

The decrease in the actuarial loss during the year ended December 31, 2020, compared to the year ended December 31, 2019 was mainly due to the decrease in the discount rate, resulting from a decrease in the implicit rate of high-quality fixed income investments.

The weighted average assumptions used in determining the periodic net cost and benefit obligation information related to the plans are as follows:

	Year Ended December 31, 2020	Year Ended December 31, 2019
<u>Net periodic benefit cost :</u>		
Discount rate	0.4%	0.9%
Rate of compensation increase	1.7%	1.7%
<u>Benefit obligation:</u>		
Discount rate	0.4%	0.9%
Rate of compensation increase	1.7%	1.7%

(16) 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 consolidated operating segment. 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. Refer to Note 1 of these consolidated financial statements for further detail.

The Company's property, plant and equipment, net of accumulated depreciation, were located in the following geographical areas as of December 31, 2020 and 2019 (in thousands):

	As of December 31,	
	2020	2019
United States	\$ 2,878	\$ 2,809
Korea	2,472	2,020
Japan and Vietnam	1,018	1,074
Taiwan and India	17	24
Germany	761	842
	<u>\$ 7,146</u>	<u>\$ 6,769</u>

(17) Subsequent Events

Equity Offering

On January 26, 2021, the Company entered into an underwriting agreement to sell 4.6 million shares of common stock (including 0.6 million shares issued pursuant to the underwriters' option to purchase additional shares) at a price of \$14.00 per share in an underwritten public offering. The equity offering closed on January 29, 2021 and resulted in gross proceeds to the Company of approximately \$64.4 million and net proceeds to the Company, after deducting underwriting discounts and commissions and offering expenses, of approximately \$60.2 million. The Company used a portion of the net proceeds from Equity Offering to pay off the entire remaining outstanding balance of debt with related parties.

Optelian Acquisition

On February 5, 2021, the Company acquired Optelian Access Networks Corporation, a leading optical networking solution provider based in Ottawa, Ontario, Canada, and its portfolio of optical transport solutions, in exchange for total purchase price of \$5.0 million and contingent consideration based on a certain percentage of future revenue. We expect to complete our preliminary allocation of the purchase consideration to the assets acquired and liabilities assumed by the end of the first quarter of 2021.

RIFT Acquisition

On March 4, 2021, the Company announced its acquisition of the business of RIFT, Inc., a network automation solutions company.

Keymile GmbH

On March 8, 2021, the Company made the strategic decision, subject to the proper involvement of the employee representatives, to transition DZS GmbH to a sales and research and development center. Negotiations are being held with the works council in Germany on a reconciliation of interests and a social plan. DZS GmbH is expecting to reduce headcount by approximately 100 employees.

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, 2020, 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 effective as of December 31, 2020.

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, 2020, 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 of Sponsoring Organizations of the Treadway Commission. Management concluded that, as of December 31, 2020, our internal control over financial reporting was effective based on those criteria. The effectiveness of our internal control over financial reporting as of December 31, 2020 has been audited by Grant Thornton LLP, an independent registered public accounting firm, and Grant Thornton LLP has issued a report on our internal control over financial reporting, which is included herein.

Changes in Internal Control over Financial Reporting

In connection with our audit of the fiscal year 2019 consolidated financial statements, we and our independent registered public accounting firm determined that we had material weaknesses in our internal control over financial reporting. These material weaknesses primarily pertained to management’s assessment related to insufficiency of qualified personnel, including a lack of qualified personnel to account for significant unusual transactions; financial close and reporting, including monitoring foreign subsidiaries; and the Company’s control environment, specifically inventory valuation and revenue recognition.

During the year ended December 31, 2020, we implemented enhanced procedures and controls to remediate the material weaknesses in our internal control over financial reporting. Specific remedial actions undertaken by management included, without limitation:

- the hiring of additional accounting and finance resources with public company experience;
- implementation of processes and controls related to the monitoring of foreign subsidiaries in the financial close and reporting process; and
- implementation of additional review controls and processes, specifically for inventory valuation and revenue recognition.

We have completed the execution of our remediation plan as of December 31, 2020. During the fourth quarter 2020, we completed our testing of operating effectiveness of the implemented controls and found them to be effective. As a result, we have concluded the material weaknesses to be remediated as of December 31, 2020.

Except for the remediation measures described above, 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.

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

None.

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 2020 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 "Information About our Executive Officers" 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://investor.dzsi.com/governance/governance-documents>. 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 42 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	
2.1	Share Purchase Agreement dated as of October 5, 2018, by and between ZTI Acquisition Subsidiary III Inc. and Riverside KM Beteiligung GmbH	8-K	10.1	January 1, 2019	
2.2	Agreement, dated as of December 31, 2018, by and between ZTI Acquisition Subsidiary III Inc. and Riverside KM Beteiligung GmbH	8-K	10.3	January 1, 2019	
2.3	Share Transfer Agreement dated as of July 31, 2019 by and between Handysoft, Inc., as Transferor, and DASAN Zhone Solutions, Inc., as Transferee	8-K	2.1	August 5, 2019	
3.1	Restated Certificate of Incorporation of DASAN Zhone Solutions, Inc., as amended through February 28, 2017	10-K	3.1	September 27, 2017	
3.1.1	Certificate of Amendment to the Restated Certificate of Incorporation of DZS Inc.	8-K	3.1	August 27, 2020	
3.2	Amended and Restated Bylaws of DASAN Zhone Solutions, Inc.				X
4.1	Description of Capital Stock				X
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	10-K	10.1.1	March 12, 2019	
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 27, 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	
10.4#	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#	Employment Agreement dated August 1, 2020, by and between DASAN Zhone Solutions, Inc. and Charles Daniel Vogt	10-Q	10.2	November 6, 2020	

10.7#	Stock Option Agreement dated August 1, 2020, by and between DASAN Zhone Solutions, Inc. and Charles Daniel Vogt	10-Q	10.3	November 6, 2020	
10.8#	Stock Option Agreement dated August 1, 2020, by and between DASAN Zhone Solutions, Inc. and Charles Daniel Vogt	10-Q	10.4	November 6, 2020	
10.9#	Employment Agreement, dated as of December 2, 2019, by and between DASAN Zhone Solutions, Inc. and Tom Cancro	8-K	10.1	November 25, 2019	
10.9.1#	Amendment to Employment Agreement dated as of December 1, 2020 by and between DZS Inc. and Thomas Cancro	8-K	10.1	December 4, 2020	
10.10#	Employment agreement dated as of September 28, 2020 by and between DZS Inc. and Justin L. Ferguson.				X
10.11#	Employment Agreement dated as of June 18, 2020 by and between DASAN Zhone Solutions, Inc. and Philip John Yim	8-K	10.1	June 19, 2020	
10.12#	Amended and Restated Employment Agreement dated as of October 10, 2017 by and between DASAN Zhone Solutions, Inc. and Il Yung Kim	10-K	10.8	April 4, 2018	
10.13	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	
10.14	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	
10.14.1	Amendment No. 1 to Loan Agreement dated as of February 25, 2019 by and between DASAN Network, Inc., as Lender, and DASAN Network Solutions, Inc., as Borrower	10-Q	10.3	May 10, 2019	
10.15	Loan Agreement dated as of December 27, 2018 by and between DASAN Networks, Inc., as Lender, and DASAN Zhone Solutions, Inc., as Borrower	8-K	10.2	January 3, 2019	
10.15.1	Amendment No. 1 to Loan Agreement dated as of February 25, 2019 by and between DASAN Network, Inc., as Lender, and DASAN Network Solutions, Inc., as Borrower	10-Q	10.4	May 10, 2019	
10.16	Revolving Credit, Term Loan, Guaranty and Security Agreement dated as of February 27, 2019 by and among PNC Bank, National Association, Citibank, N.A., DASAN Zhone Solutions, Inc., and the lenders named therein	10-Q	10.1	May 10, 2019	
10.17	Export-Import Revolving Credit, Guaranty and Security Agreement dated as of February 27, 2019 by and among PNC Bank, National Association, Citibank, N.A., DASAN Zhone Solutions, Inc., and the lenders named therein	10-Q	10.2	May 10, 2019	
10.18	Letter Agreement dated May 10, 2019 by and among PNC Bank, National Association and Citibank, N.A., as lenders, and DASAN Zhone Solutions, Inc., as borrowing agent	10-Q	10.1	August 14, 2019	

10.19	Letter Agreement dated May 31, 2019 by and among PNC Bank, National Association and Citibank, N.A., as lenders, and DASAN Zhone Solutions, Inc., as borrowing agent	10-Q	10.2	August 14, 2019	
10.20	Letter Agreement dated November 8, 2019 by and among PNC Bank, National Association and Citibank, N.A., as lenders, and DASAN Zhone Solutions, Inc., as borrowing agent	10-Q	10.3	November 13, 2019	
10.21	Loan Agreement dated March 3, 2020 and entered into as of March 4, 2020 by and between DASAN Networks, Inc. and DASAN Network Solutions, Inc. (Korea)	8-K	10.1	March 10, 2020	
10.22	Intellectual Property Pledge Agreement dated March 3, 2020 and entered into as of March 4, 2020 by and between DASAN Networks, Inc. and DASAN Network Solutions, Inc. (Korea)	8-K	10.2	March 10, 2020	
10.23	Share Pledge Agreement dated March 3, 2020 and entered into as of March 4, 2020 by and among DASAN Networks, Inc., DASAN Network Solutions, Inc. (Korea) and DASAN Network Solutions, Inc. (California)	8-K	10.3	March 10, 2020	
21.2	List of Subsidiaries				X
23.1	Consent of Independent Registered Public Accounting Firm				X
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 Label 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.

DZS INC.

Date: March 11, 2021

By: /s/ Charles Daniel Vogt
Charles Daniel Vogt
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/ Charles Daniel Vogt</u> Charles Daniel Vogt	President, Chief Executive Officer (Principal Executive Officer) and Director	March 11, 2021
<u>/s/ Thomas J. Cancro</u> Thomas J. Cancro	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 11, 2021
<u>/s/ Min Woo Nam</u> Min Woo Nam	Chairman of the Board of Directors	March 11, 2021
<u>/s/ Matt Bross</u> Matt Bross	Director	March 11, 2021
<u>/s/ Barbara Carbone</u> Barbara Carbone	Director	March 11, 2021
<u>/s/ Joon Kyung Kim</u> Joon Kyung Kim	Director	March 11, 2021
<u>/s/ David Schopp</u> David Schopp	Director	March 11, 2021
<u>/s/ Choon Yul Yoo</u> Choon Yul Yoo	Director	March 11, 2021

Important Information Regarding Forward-Looking Statements

This Annual Report and Proxy Statement contain forward-looking statements within the meaning of the U.S. Private Securities Litigation Reform Act of 1995, which are subject to a number of risks and uncertainties. All statements other than statements of historical fact contained in this Annual Report and Proxy Statement are forward-looking statements. Without limiting the foregoing, the words “anticipates”, “believes”, “could”, “estimates”, “expects”, “intends”, “may”, “plans”, “seeks”, “projects”, “will” and other similar language, whether in the negative or affirmative, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. The forward-looking statements in this Annual Report and Proxy Statement include statements regarding the impact of the COVID-19 pandemic on our business, financial results and financial conditions, management’s goals, plans and intentions, product offerings and our position in the market, are based on our current expectations and assumptions regarding our business, the economy and other future conditions. Although we believe that our current expectations and assumptions are reasonable, readers are cautioned that these forward-looking statements are only predictions and are subject to inherent uncertainties, risks and changes in circumstances that are difficult to predict, and our actual results may differ materially from those contemplated by the forward-looking statements as a result of various factors, including risks related to the COVID-19 pandemic and those discussed in the “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and “Risk Factors” sections of the copy of our Form 10-K included as part of this Annual Report. Any forward-looking statement represents our views only as of the date such statement was made and should not be relied upon as representing our views as of any subsequent date. While we may elect to update forward-looking statements in the future, we specifically disclaim any obligation to do so.



Enabling the
Hyper-Connected World