



Annual Report

2022

www.dzsi.com



To Our Shareholders:

The global communications industry is undergoing a transformation propelled by new technologies and continued bandwidth traffic growth driven by the emergence of new virtual applications and the desire for a better broadband experience. To meet these demands, service providers must push both compute and intelligence to the network edge — closer to where data is created and consumed, and the subscriber experience is defined. As a result, our industry is primed for disruption, creating new

opportunities for service providers and vendors alike who are agile, innovative, and ready to embrace edge-centric strategies.

Two years ago, we recognized this transformation and embarked on a strategy to disrupt the market and seize this opportunity. Our initial priorities included enhancing our executive leadership team, focusing our R&D initiatives and instilling an entrepreneurial, customer-first culture, and our passion has attracted executive and engineering talent from across the industry. Our journey has made tremendous progress as we strive towards disrupting the industry at the Access Edge, Optical Edge, and Cloud Edge.

The first step in our evolution was one of the most transformative — a product rationalization and globalization strategy that has resulted in a nearly 60% reduction in hardware SKUs. This reduced our supply chain risk and allowed us to allocate more R&D resources to new platform and software solutions. We accelerated our transformation as we bolstered our product portfolio via the acquisitions of two companies during the first quarter of 2021: software defined orchestration, automation, and service accelerator provider RIFT and coherent optics innovator Optelian Access Networks Corporation (Optelian).

Building upon our differentiated software vision and strategy, we took another major step when we acquired core assets of Adaptive Spectrum and Signal Alignment, Incorporated (“ASSIA”) in May 2022. The ASSIA Expresse and CloudCheck software solutions are the foundation for an end-to-end network and service orchestration, automation, service assurance and experience management solution set.



DZS now has a comprehensive service assurance and experience management software platform managing over 70 million homes in partnership with our service provider customers including some of the largest carriers in Western Europe, North America, and southeast Asia. In addition to strengthening the value proposition of our solution and our customer relationships, these new software solutions and new marquee customers have layered in a recurring software revenue stream to our financial results.

At the Access EDGE, we unveiled the DZS Velocity V6, a next-generation optical line termination (OLT) system that delivers industry leading performance and redefines how service providers deploy passive optical networking in a variety of locations. Complementary to our other Velocity OLTs, the full portfolio is built on a common hardware and software platform, which provides uniform operations for our customers and a streamlined product development process to introduce new services and applications.

These new solutions allow DZS to bundle higher margin software with our existing access and optical infrastructure systems. As announced when we reported our Q4 2022 earnings results, Europe's largest service provider recently selected the DZS Velocity V6 to be part of their multi-year fiber-to-the-home project. This service provider will now be leveraging our end-to-end Access EDGE, networking orchestration, cloud-controlled service assurance and in-home Wi-Fi software management.

Our transformation has also captured the attention of long-standing customers like Korea Telecom, South Korea's largest fixed wireline network operator. We

recently announced that KT has selected our next-generation Velocity OLT portfolio for their next Phase PON rollout.

At the Optical EDGE, DZS has introduced the Saber 4400, an environmentally hardened and coherent optics-driven transport platform. Designed to address last mile broadband access aggregation challenges at the network edge, the Saber 4400 delivers deployment and operational cost savings as it eliminates the need for climate-controlled environments.

Another milestone in the DZS transformation was the exit of our internal manufacturing and successful completion of the transfer of our Seminole, Florida manufacturing facility to contract manufacturer Fabrinet. This transition will allow us to free-up resources that have been dedicated to supply chain management and manufacturing, enabling us to shift our focus to more strategic growth initiatives.

Our vision, playbook, investments and execution are yielding new customer wins, new projects and an expanded addressable market that spans the middle and last mile access network. Equally important, our employee base has bought into our vision, strategy and culture and is putting us in a position to capture strategic projects with marquee customers in the future.



2022 Performance Highlights

People

DZS continued to add talent to our executive leadership team and global employee base across research & development (R&D), product line management (PLM), sales, marketing, supply chain, finance, and IT in 2022. We also successfully assimilated the strong R&D resources of our ASSIA acquisition into our DZS culture while integrating their software products into our portfolio.



Customer Growth

Our Access Edge, Subscriber Edge, Optical Edge and Cloud Edge software solutions resonated with customers, prospects and partners around the world in 2022. We continued to expand the footprint of our platforms, systems, and solutions with over 200 new customers added over the last two years. We also initiated numerous Access and Optical Edge and Cloud software proof of concepts (POCs) and trials with large scale service providers during the year. In addition, we expanded our presence among Tier 1 service providers, with 30 of the world's top 50 communications service providers now DZS customers.



2022 Financial and Operational Performance

During 2022, our financial results experienced the impacts of inflation, COVID-related lockdowns in Asia and continued supply chain pressures. Additionally, our financial performance was impacted by foreign currency movements as the conversion of sales from Asia into US dollars became a formidable headwind to reported revenue.

- 2022 revenue reached a record \$376 million, an increase of 7% compared to 2021. Full year revenue would have been \$31 million higher on a constant currency basis. During the year, we strengthened our software portfolio via the ASSIA asset acquisition, which increased the percentage of revenue from software and services to 11% in 2022, from 6% in 2021.
- Full year adjusted gross margin* was 32.0% compared with 34.6% in 2021, mainly impacted by foreign currency headwinds and elevated freight and logistic costs and expedite fees. Excluding these factors and adjusting for constant currency, our 2022 adjusted gross margin would have been over 700 basis points higher.
- 2022 adjusted EBITDA* was a loss of \$3 million compared with adjusted EBITDA of \$11 million in 2021. Adjusted EPS* was a loss of \$(0.15) compared with an adjusted EPS of \$0.32 in 2021.
- At the end of 2022, we had \$38 million in cash along with \$23 million of debt as part of the five-year term loan to fund the ASSIA acquisition that closed in May 2022.

Products, Margins and Synergies

During 2022, our product focus shifted from product rationalization and strategic alignment of our global product portfolio to strategic enhancement. Our pivot to a platform-based development approach for our Software and Systems solutions give DZS R&D teams the capacity to increase product innovation with reuse of technology across multiple products, improving our ability to bring innovative and differentiated products to market quickly. In addition, we are achieving synergies within our product portfolio through the consolidation and cross-selling of products. For example, CloudCheck software is now being integrated into DZS Helix Subscriber Edge solutions to simplify the cross-sale of software and hardware.



Operations and Supply Chain

Supply chain pricing, freight and logistics costs, and expedited fees related to availability and extended lead-times remained headwinds throughout 2022 as anticipated. Further, foreign currency volatility added additional headwinds. We remain cautious about continued supply chain and foreign currency headwinds that have challenged the industry and anticipate some continued supply chain constraints to persist throughout 2023.

On Oct. 4, DZS announced its selection of Fabrinet in a strategic shift to a contract manufacturing model. Our valued manufacturing partnership with Fabrinet is expected to improve our global reach scalability, reduce costs and improve product margins. We successfully completed the transfer of our Seminole, Florida manufacturing facility to Fabrinet.



**DZS defines Adjusted gross margin, Adjusted EBITDA and Adjusted EPS as the applicable GAAP metric adjusted to exclude (i) depreciation and amortization, (ii) stock based compensation, and (iii) the impact of material transactions or events that we believe are not indicative of our core operating performance and may or may not be recurring in nature.*



Product & Technology Innovation

Streamlining Platform Development

A streamlined innovation process and the expansion of DZS engineering resources driven by the acquisition of ASSIA resulted in exceptional productivity from our R&D teams globally. Our Access Edge, Optical Edge, Subscriber Edge and Cloud Edge software pillars continued to become more robust In 2022, as illustrated by the introduction of a number of award-winning products including the DZS Velocity V6, the DZS Saber 4400, the DZS Chronos M4000, and DZS Xtreme orchestration and automation software solution.

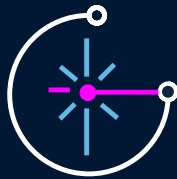
Broadband Access Accelerated



**Access
EDGE**



Optical Transport Without Limits



**Optical
EDGE**



The Connected Home Unleashed



**Subscriber
EDGE**



Deliver the Ultimate Broadband Experience



**Cloud
EDGE**



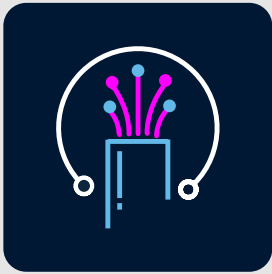


The DZS Edge Portfolio — Empowering the Edge

Edge transformation is a strategic and business imperative for CSPs. DZS systems and software simplify this transformation, and provides the end-to-end, standard-based solutions that give CSPs a Competitive Edge.

- **DZS Velocity is the industry's only Access Edge-ready portfolio** – hardened solutions in a range of flexible form factors that deliver world-leading performance and density with in-place upgrades from 10G to 50G/100G technologies
- **DZS Helix provides solutions fine-tuned to the needs of the Subscriber Edge** – residential & business ONTs, access points, and gateways with world-class WiFi and proven interoperability
- **DZS Saber redefines the Optical Edge with the first hardened, compact, and modular DWDM transport platform** – Featuring 100G-400G per lambda and multi-degree CDC FlexGrid ROADM
- **DZS Chronos accelerates 4G/5G deployment at the mobile Optical Edge** – hardened xHaul systems that have become the standard in the industry's most advanced O-RAN deployments
- **DZS Cloud gives service providers command of the Cloud Edge** – provides the analytics, actionable insights, and control at the network Edge that enable the ultimate subscriber experience and operational efficiency:
- **DZS Xtreme** allows vendor-agnostic network orchestration and automation, simplifying and accelerating the introduction of new services from on-boarding new equipment and software, to testing, turn-up, administration and management.
- **DZS Expresse and CloudCheck** offer cloud-native and AI-driven network and service assurance and WiFi experience management solutions, enhanced by the expertise gleaned from 70M+ subscribers globally
- **DZS Professional Services & Customer Care help service providers transform faster with more confidence** – transformation acceleration services that give service providers a competitive Edge via an array of services, from education/training, SLAs, remote/on-site professional services and managed services to custom services and 7x24x365 technical support

Access Edge



- Architected for the Edge – Hardened, High Capacity, Flexible
- Future-Ready – In-Place upgrades to 50G/100G PON
- Highest Performance – Multi-Terabit Capacity, Non-Blocking
- Lowest TCO per Port – Leading Density, Unmatched Longevity
- Simple Integration – Netconf/Yang Support, Standards-Based
- Extensible Software Platform – Virtualization, SDN-Control
- Transformation Optimized – Deploy Centralized/Disaggregated
- World-Class Orchestration/Automation with DZS Xtreme

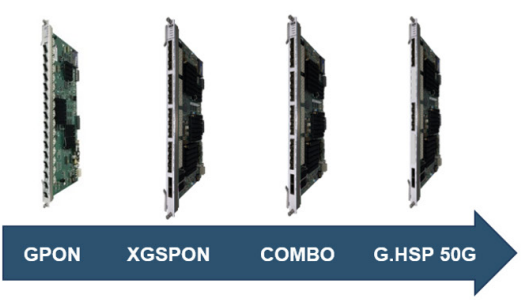
The DZS Velocity portfolio is architected for the Edge, offering environmentally hardened system across an industry-leading range of solutions spanning from the central office or data center all the way to the access Edge. Complemented by DZS Xcelerate system-on-a-card technology, the DZS Access Edge empowers service providers to leap to multi-gigabit services at scale by enabling rapid transition from GPON to XGSPON and gigabit Ethernet to 10 gigabit Ethernet and on to 50G/100G services via any service port across the range of DZS systems. DZS Xcelerate also allows service providers to transition to disaggregated architectures at their own pace by leveraging the same equipment used to pivot to multi-gigabit services, dramatically enhancing the economics of network evolution. These systems offer non-blocking architectures ready for future technologies and have been optimized for low latency and symmetric

hyperfast bandwidth through robust 800 Gbps per slot capacity.

DZS Access Edge solutions allow service providers to take a no-compromise approach to their network investments by accelerating and simplifying the network-wide deployment of future-proof, next-generation, multi-gigabit services over fiber, so they can deliver the advanced services expected by their customers with maximum flexibility.

The DZS Velocity portfolio of broadband access systems, switches, and routers, are unified by our powerful Software Defined Network (SDN) enabled operating system sdNOS, providing carriers with extraordinary flexibility to the latest fiber access technologies and software-centric operational models that are open and aligned with Broadband Forum standards.

Line Cards



	V1-16XC	V2 Chassis	V6 Chassis	V14 / V16 Chassis
Max # OLT ports (or combo ports)	16	32	96	256
Rack Units	1	2	6	14
Max Uplink (NNI) Capacity	200Gps	400Gps	3Tbps	5Tbps

Subscriber Edge



- Optimized for Edge Performance – Superior WiFi, Intelligence
- AI-Driven Excellence – Self-Optimized WiFi Performance
- Predictive Analytics – Real-Time, Automated, Actionable
- Latest Technologies – WiFi 6e, EasyMesh, Businesses Features
- Lowest OPEX/Churn – Ultimate Experience with CloudCheck
- World-Class Subscriber App – Cybersecurity, parental controls
- Broadest Interop – Wide 3rd Party Compatibility, Smart OMCI

The Subscriber Edge is the portion of the access network that connects broadband delivered to the home or business directly to the consumer across their broadband-enabled devices. In doing so, it is the interface to the customer and often plays a disproportionately prominent role defining the subscriber experience. DZS Subscriber Edge solutions extend multi-gigabit broadband connectivity throughout the home and office and to the specific devices connected to the WiFi network.

The DZS Helix portfolio offers an industry-leading range of residential and business optimized access points, ONTs and gateways featuring the latest WiFi technologies, business features, and Smart OMCI technology for rapid 3rd party interoperability and manageability. Many of these

standards-based, solutions have the processing power to provide extraordinary insight into the premises and connected devices, especially when managed by DZS Cloud Edge software.

Our carrier-grade ONTs, WiFi access points and service gateways are designed to meet emerging service provider and end-user requirements for ubiquitous broadband access throughout the home driven by the growth of cloud-connected media content, mobile devices, and IoT. Using innovative hardware designs and industry-leading software services, DZS offers the subscriber the ultimate immersive WiFi experience and the ability to manage their personal networks.

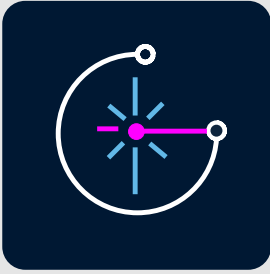



20,000,000+
ONT / WiFi Devices




70,000,000+
Cloud Subscribers

Optical Edge



- Built for the Transport Edge – Hardened, Flexible, Scalable
- Extraordinary Capacity – 400G per Wavelength, 1.6T per 1RU
- Proven xHaul – Serving World’s Most Advanced 5G Networks
- Advanced Mobile Transport – TSN, GrandMaster Clock
- Smart Middle Mile – World’s Only 1RU CDC FlexGrid ROADM
- Lowest Installed Cost – Save \$200K per Site, Pay-as-you-Grow
- Standards Aligned – O-RAN and OpenROADM Leadership
- Long Distance – Up to 120km without Amplification

The Optical Edge consists of the portion of the access network that transports aggregated traffic back to the network core. DZS has invested heavily in transport technologies (including 100/400 Gbps coherent optics and ROADM) and is recognized as the first company in the industry to environmentally harden coherent optics. The DZS Saber and DZS Chronos portfolios were architected to bring unprecedented transport capacity and flexibility to the network edge.

Saber Platforms: Reimagine the Optical Edge

The DZS Saber platforms were the first to bring hardened coherent optical solutions to the optical Edge, delivering up to 400Gbps with each wavelength in modular 1RU solutions that can be deployed in unimproved remote cabinets and huts, resulting in savings of up to \$200k per location versus traditional solutions, and stacked for extraordinary capacity. Reaching unamplified distances of up to 120km, Saber also features support for multi-degree Flex Grid ROADM in the industry’s smallest form factor. The hardened DZS Chronos systems feature advanced timing (TNS and Grandmaster Clock) and extraordinary capacity for mobile xHaul, including proven O-RAN support.



DZS Chronos: Reimagine the Mobile Edge

The Mobile Edge is a portfolio within our Optical Edge that specializes in innovative 5G and Open RAN (O-RAN) mobile transport solutions. This portfolio is characterized by extremely low latency, the integrated timing necessary to manage service assurance in today’s advanced mobile networks, and high performance and capacity. Together, this portfolio provides a wide range of proven systems that are pioneering the mass deployment of 5G and O-RAN deployments globally.



Cloud Edge

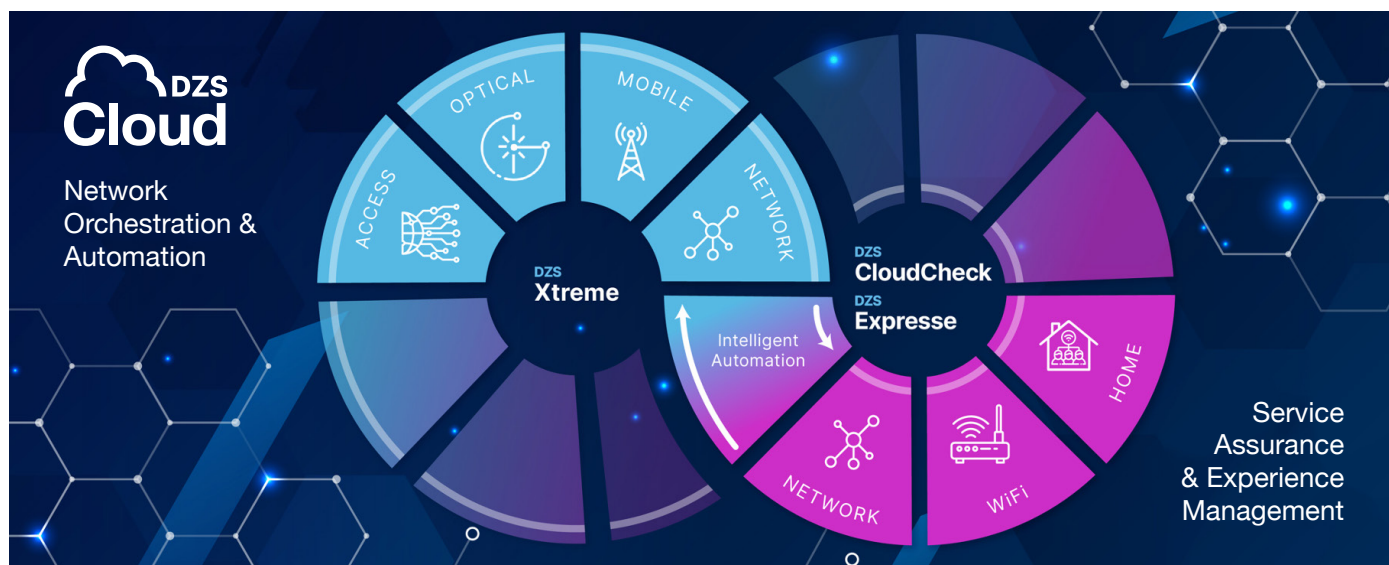


- Empowers Edge Excellence –
Orchestration, Automation, Experience
- E2E Services Management – Access,
Transport, NFV Domains, Slicing
- Single Pane of Glass – Across All
Multi-Vendor Equipment and Apps
- Launch New Services Fast – Reduce
On-Boarding from Months to Days
- Unparalleled Experience Management –
Connected Device to Core
- Command WiFi Experience – Intercept
Issues, Reduce Calls/Truck Rolls
- Unrivaled Home Control & Visibility –
Self-Service, Personalize, Control
- Proven Scale & Extensive Expertise –
70M+ Connected Subs, AI Insights

DZS Cloud is the platform that sits above the Access, Optical, and Subscriber Edge solutions and enables extraordinary service provider agility, efficiency, intelligence, and experience creation. DZS Cloud offers the industry's most advanced and comprehensive cloud-native and AI-driven solutions for multi-vendor orchestration and automation, network and service assurance, and WiFi experience management. With over 70M subscribers under management, these award-winning solutions bring unprecedented intelligence and expertise to the network, allowing service providers to transform into experience providers. The results are dramatic. DZS Cloud Edge software solutions empower service providers to automate, orchestrate and optimize their network performance, and leverage advanced data

analytics to improve customer satisfaction, increase revenue and build customer loyalty. Observed results include reduced support times, truck rolls, and support costs while providing subscribers with experience control and self-service capabilities and operators with new revenue opportunities through new services and targeted marketing. DevOps support greatly facilitates the onboarding of new services and equipment, whether DZS or 3rd party, from months to days.

Combining globally deployed DZS Expresse service assurance (DSL and PON) and DZS CloudCheck WiFi experience management software with our pioneering DZS Xtreme network orchestration and automation software provides a unique value proposition for multi-vendor service provider network environments.




By integrating with the three DZS broadband portfolio pillars of Access Edge, Optical Edge, and Subscriber Edge, Cloud Edge unlocks the door to transforming today's service provider into tomorrow's experience provider, giving them the competitive edge, they need to thrive in their markets.

Support Services

The operation and maintenance of modern telecommunications networks is a complex task. A variety of network elements of different generations and configurations must be maintained.

It is more critical than ever before for broadband service providers to have 24/7 access to support resources for all network elements.

- **Education & Training**
- **Service Level Agreement (SLA)**
 - Access to DZS Technical Support, Software Fixes, Online resources, and extended Warranty.
- **Remote Professional Services**
 - Configuration changes
 - Network Audits
 - Subscriber Move / Add / Changes
 - SW Upgrades
 - 24x7 Help Desk
- **On-Site Professional Services**
 - Dedicated Support Engineer / Resident Engineer
 - Engineer, Furnish, & Install (E, F & I)
- **Managed Services**
 - FiberLAN "GPON in a box" w/ Remote Monitoring
 - Data Collection Engines
 - Network Health Reports
 - NOC as a Service



DZS is dedicated to supporting service providers in maximizing the reliability and uptime of their networks. To ensure reliable and high-quality network operations, DZS offers a variety of standard services, and will develop custom-tailored services for its customers as required:

- Global and Local Technical Assistance Services (7 x 24)
- Professional and Installation Services
- Training Service
- Local Hardware Repair and Return
- On-Site Engineering Services

In addition to our industry-leading products, DZS provides a comprehensive offering of exceptional professional services that include 7x24x365 maintenance and technical support, software updates, technical training, along with network design and consulting services. Our engineering and support staff embody the same values of quality and performance that are reflected in our products and corporate culture.

Transformative Acquisition & Strategic Year

- On Feb. 8, 2022, we entered into a strategic global banking relationship with J.P. Morgan that includes a \$30 million credit facility. While we don't intend to draw down on the credit facility in the near future, the facility is in place for general corporate purposes.
- With our existing S-3 shelf registration expiring in April 2022, we filed a new three-year shelf registration statement for continued financial flexibility.
- On May 27, 2022, DZS acquired core assets of ASSIA, an industry pioneer of broadband access quality-of-experience solutions whose CloudCheck WiFi experience management and Expresse access network optimization solutions are deployed by leading tier 1 operators globally to over 70 million subscribers.
- On Nov. 21, 2022, DZS closed a \$28.8 million follow-on equity offering to strengthen the balance sheet to support future growth initiatives.





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:



KT Corporation is the Republic of Korea's largest wireline broadband service provider and a DZS customer since 2005. They have announced that they have chosen the DZS Velocity Access Edge platform and advanced optical line terminal (OLT) technology as the foundation for their new 10 Gigabit per second (Gbps) Fiber-to-the-Premises (FTTP) Ethernet Passive Optical Networking (EPON) infrastructure across the country's southern half, bringing world-class residential and business internet, voice and video services throughout the region.



To prepare for new demands for bandwidth-intensive services that we know are coming, KT is upgrading our existing 1Gbps network infrastructure to 10Gbps with the DZS Velocity Access Edge platform... The new platform's deployment flexibility, cost-effectiveness, due to its high density and ongoing energy and space savings, and proven reliability were key to our selection.

– SangWook Kim
Director, Access Network Technology, KT



TalkTalk

TalkTalk Group is the UK's leading value for money consumer and B2B telecoms provider. TalkTalk is leveraging CloudCheck and Expresse Cloud Edge software solutions from DZS to optimize broadband quality of experience for a large number of its direct and wholesale residential subscribers and business customers and improve efficiencies.



CloudCheck and Expresse allow us to monitor, score and optimize our customers' connectivity experience, both in and to the home. In addition, the DZS solutions help us to reduce call escalations, minimize unnecessary equipment replacements and shorten average call handling times.

– Phil Haslam
CTO, TalkTalk



MID-HUDSON Cable

Mid-Hudson Cable is an award-winning provider of high-speed internet, digital television and digital voice services in the Hudson Valley, New York area. The DZS Velocity V6 system is providing the fiber access technology foundation for upgrading its existing fiber infrastructure to a world-class next-generation network capable of delivering symmetric data rates of 10 Gbps today and beyond in the future.

“The state-of-the-art DZS technology we are deploying offers us not just symmetrical 10-gig service levels today, but also a clear path to 50-gig and even higher speeds going forward. These levels of performance will soon become essential as more people are increasingly using bandwidth-intensive, latency-sensitive services like online gaming, virtual and augmented reality, Ultra High Definition (UHD) virtual conferencing and telemedicine across a growing number of devices.

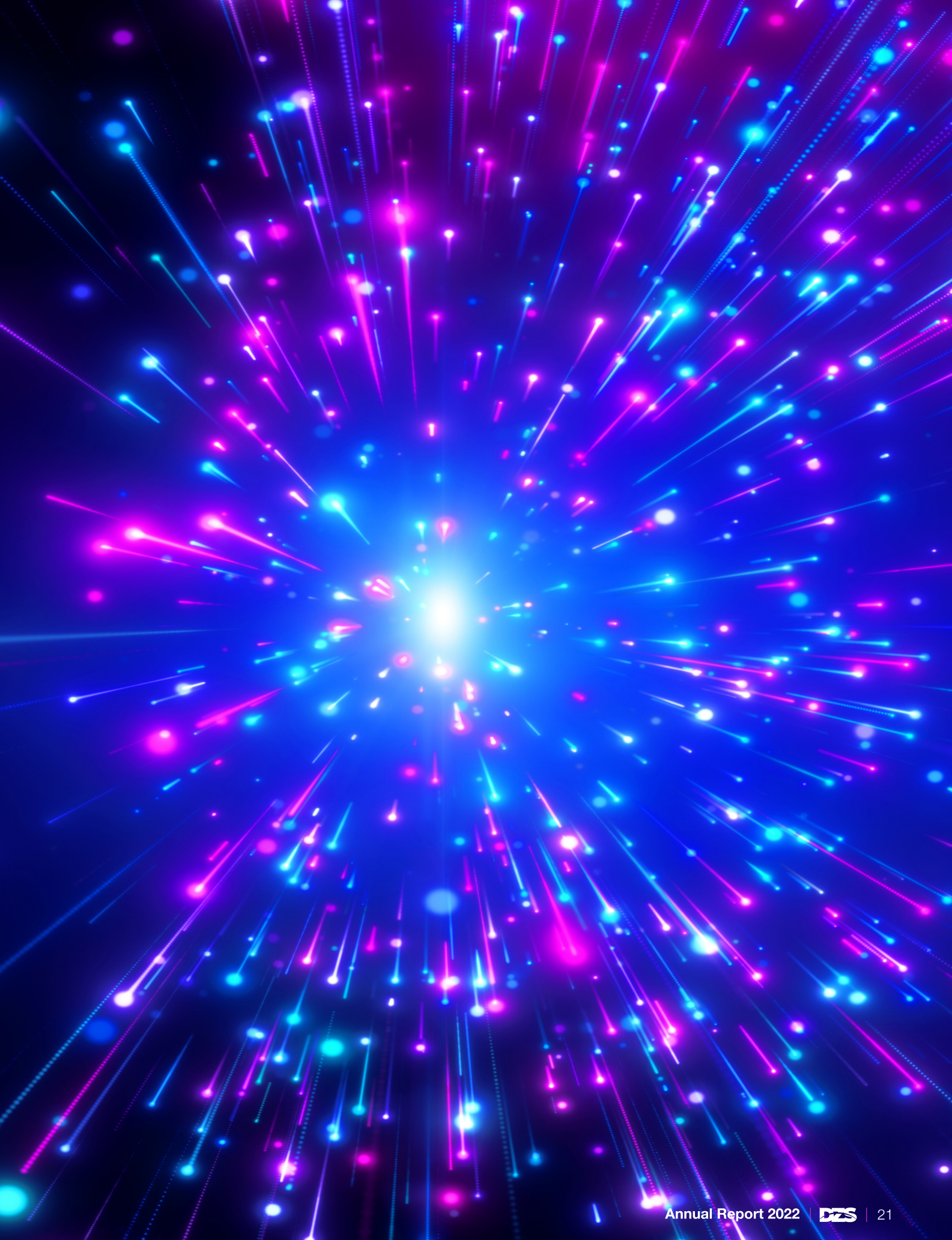
– **James Reynolds**
CEO, Mid-Hudson Cable



Consolidated Communications Holdings, Inc., is a leading broadband and business communications provider serving consumers, businesses, and wireless and wireline carriers across rural and metro communities and a 20-plus state service area. Leveraging an advanced fiber network, they offer a wide range of communications solutions, including: high-speed Internet, data, phone, security, managed services, cloud services and wholesale carrier solutions.

“DZS has been a close strategic partner to Consolidated Communications for over a decade, helping us to both innovate and grow our networks and services. Now, as we are making the leap to a multi-gigabit service experience across a wide swath of our footprint, they are enabling us with the technology and innovation we need to lead in the markets that we serve..

– **Eric Harvard**
Senior Director, Network Architecture, Consolidated Communications Inc.



Positioned for the Future

We believe that the technology, sales and marketing investments made in 2022 will result in new access, optical and cloud software project wins in 2023, appreciating that we exited 2022 with the most active POC and trial environment, since I joined the company in mid-2020. We have locked in the team, aligned with our vision, strategy and culture, giving us the best opportunity to secure strategic projects with marquee customers and to elevate our growth and profitability.

As service providers continue to upgrade their legacy DSL and sub1 gigabit broadband networks, many operators are being architecturally thoughtful with their network design, ensuring that the technology investments they're making today will allow them to future proof their network for tomorrow, enabling them to compete with a lower total cost of ownership and with a network that is automated and software defined.

DZS is among a small number of companies with the access, optical and cloud software technology, customer footprint and the resources required to grow and take share in the current fiber based PON investment cycle. With an installed base of approximately 60,000 OLT systems, 20 million subscriber devices, 35,000 mobile and optical transport platforms and 70 million cloud software subscribers spanning more than 400 active customers, we enter 2023 better positioned than ever before.

Over the next decade, our Access and Subscriber Edge install base is expected to continue to undergo an upgrade cycle from DSL and GPON to XGS-PON. As part of our technology investment thesis, we anticipate that by 2025, large and medium sized service providers will begin upgrading their XGS-PON network to 50 gigabit PON. Our next generation Velocity OLT portfolio is designed to support 50 and up to 100 gigabit PON enabling service providers to upgrade from XGS-PON to 50 gigabit PON without an OLT systems replacement, seamlessly upgrading just the PON modules. We also expect that our DSL Express software customers will continue to upgrade to PON Express as their subscribers migrate from DSL to fiber. In addition, our in-home Wi-Fi management software platform, CloudCheck, will add layers of new functionality in 2023 including cybersecurity protection and with expanded support for Wi-Fi and IoT devices. Our sales pipeline for our cloud software portfolio continues to expand and we believe our collective

software platforms will contribute to our financial results in the future.

Despite the macroeconomic recessionary fears, broadband has become a utility like service that we believe requires service providers with scale and the financial resiliency to continue to invest in their fixed and mobile networks, ensuring they remain competitively positioned to pursue the in-home and on the go broadband market. We continue to systematically balance quarterly performance with the operational and financial requirements designed to deliver top line revenue growth, margin expansion and net operating income aligned with the service providers that have the scale and the financial means to deliver recurring and reoccurring sustainability for DZS.

We remain focused on our five growth pillars:

- The 10 gigabit XGS-PON in 5G upgrade cycle
- Market share capture in North America and Western Europe
- The pursuit of numerous Chinese vendor cap and replacement opportunities
- Our cloud software expansion and cross-selling opportunity with our existing and prospective customers
- The emergence of O-RAN, which continues to gain acceptance and momentum around the world



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 challenges of 2022 and the new opportunities that are emerging for them as we continue to accelerate. I also want to commend our talented employees for their “all-in” commitment, contribution and performance in 2022. 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 our board of directors for their guidance, support and governance throughout 2022. 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 17, 2023

“...I would like to express my sincere appreciation to our shareholders for your continued confidence and commitment to supporting DZS.”

**– Charlie Vogt,
DZS President
& CEO**

**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, 2022

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 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.

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

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

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

As of March 1, 2023, there were 31,048,773 shares outstanding of the registrant's common stock, \$0.001 par value. As of June 30, 2022 (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 \$285,798,543.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for its 2023 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 our acquisitions; future growth and revenues from our products; our ability to access 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; anticipated performance of products or services; competition; plans, objectives and strategies for future operations, including our pursuit or 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. Readers are cautioned not to place undue reliance on such forward-looking statements, which are being made as of the date of this Annual Report on Form 10-K. Except as required by law, we undertake no obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise.

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 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 factors 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. The Company’s common stock is traded on The Nasdaq Global Select Market (“Nasdaq”) under the symbol “DZSI”. 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

DZS is global provider of access and optical networking infrastructure and cloud software solutions that enable the emerging hyper-connected, hyper-broadband world and broadband experiences. The Company provides a wide array of reliable, cost-effective networking technologies and software to a diverse customer base.

We research, develop, test, sell, manufacture and support platforms in the areas of mobile transport and fixed broadband access, as discussed below. We have regional development and support centers around the world to support our customer needs. As of December 31, 2022, we employed over 765 personnel worldwide.

Our Solutions and Platforms

Our solutions and platforms portfolio include products in Access Edge, Subscriber Edge, Optical Edge, and Cloud Software.

- *Access Edge.* Our DZS Velocity portfolio offers 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, highspeed 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. XCElerate by DZS increases the velocity with which service providers can leap to multi-gigabit services at scale by enabling rapid transition from Gigabit Ethernet Passive Optical Network (“GPON”) to 10 Gigabit Symmetrical Passive Optical Network (“XGS-PON”) and Gigabit Ethernet to 10 Gigabit Ethernet via any service port across a range of existing DZS Velocity chassis and 10 gigabit optimized stackable fixed form factor units.
- *Subscriber Edge.* Our DZS Helix connected premises product portfolio offers a large collection of optical network terminals (“ONTs”) and smart gateway solutions for any fiber to the “x” (“FTTx”) deployment. DZS ONTs and Smart Gateway platforms are designed for high bandwidth services being deployed to the home or business. Our connected premises portfolio consists of indoor/outdoor ONTs and gateways delivering best-in-class data and WiFi throughout the premises to support FTTx applications. The product feature set gives service providers an elegant migration path from legacy to soft switch architectures without replacing ONTs.
- *Optical Edge.* Our DZS Chronos and DZS Saber portfolios provide robust, manageable and scalable solution for mobile operators and service providers that enable them to upgrade their mobile fronthaul/midhaul/backhaul (“xHaul”) systems and migrate to fifth generation wireless technologies (“5G”) and beyond as well as deliver robust edge transport. DZS Chronos provides a full range of 5G-ready xHaul and coherent optical capable solutions that are open, software-defined, and field proven. Our mobile xHaul and edge transport 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 or be leveraged as transport vehicles for FTTx deployments. 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. Our DZS Saber portfolio provides high bandwidth optical transport and services, enabling service providers to push high bandwidth transport closer to their subscribers near the edge of their networks. Complementary to the growth of high bandwidth technologies like XGS-PON and 5G mobile at the access edge, DZS Saber products leverage environmentally hardened dense wavelength-division multiplexing (DWDM) coherent optics to deliver transport bandwidth speeds from 100 gigabits per second (Gbps) to 400 Gbps over long distances that can be necessary to support advanced access and mobile technologies. Some DZS Saber platforms also provide additional feature such as multi-degree colorless directionless contentionless (CDC) FlexGrid reconfigurable optical add-drop multiplexer (ROADM) functionality, which allows service providers to easily adjust to changing network traffic demands.

- *Cloud Software.* Our DZS Cloud platform provides software capabilities specifically in the areas of network orchestration, application slicing, automation, analytics, service assurance, and consumer broadband experience. Via our DZS Xtreme solutions we offer a commercial, carrier-grade network-slicing enabled orchestration platform complementing our position with physical network devices supporting Open RAN (“O-RAN”) and 4G/5G networks. Communications service providers are implementing software defined networking (“SDN”) and network functions virtualization (“NFV”) architectures to reduce reliance on proprietary systems and hardware, which increase service agility, flexibility, and deployment of new network services while lowering costs. Our Expresse software solution provides a clear view of multi-vendor, multi-technology access networks for both network and service assurance while monitoring, identifying, diagnosing, and fixing network problems via an artificial intelligence (AI) based recommendation engine. CloudCheck software is an advanced WiFi experience management and analytics solution that enables communications service providers to monitor, manage and optimize home WiFi networks. DZS customers are implementing experience and service assurance solutions to reduce support costs, including specifically the costs of WiFi troubleshooting and truck rolls, improve service performance and customer satisfaction, and ultimately reduce subscriber churn and increase average revenue per user (ARPU).

Industry Background

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 xHaul, 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 providers. Increased subscriber usage of smartphone, video streaming services, PC gaming services and high definition and ultra-high-definition televisions has increased the network throughput demand driven by 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-based services, Internet of Things (IoT), and 5G have also increased the demand for broadband network access and customer premises solutions. All 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 terminal 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. The demand for FTTx is also driven by various government sponsored broadband stimulus funding programs. These initiatives cultivate broadband opportunities around the world. Several of the most prominent initiatives are in North America, including American Rescue Plan Act (ARPA), the CARES Act, the Consolidated Appropriations Act, the Rural Digital Opportunity Fund (RDOF) and the Infrastructure Investment and Jobs Act. Global government sponsored broadband stimulus initiatives are less commonly known, though equally important in their contributions to the investment in fiber-optic broadband access network. We are benefiting from several customers that have accelerated their network investment because of government broadband stimulus programs.

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

We strive to balance growth with financial discipline that specifically focuses on improving product margins, increasing recurring software and service revenue, and managing expenses to drive profitability. The principal elements of our strategy include:

- **Global Presence.** We have a global customer base with active customers in more than 70 countries worldwide. We provide our network access solutions to Tier 1, national, and regional carriers in the Asia-Pacific region, the Middle East region and Europe, as well as in North America and Latin America. We leverage our global infrastructure, which includes sales offices all over the world, research and development centers in the United States of America (“United States” or “U.S.”), the Republic of Korea (“South Korea”), Vietnam, India, Spain, and Canada and inhouse and contract manufacturing capabilities in the United States, South Korea, Vietnam, and China, to support our customer base.
- **Leading FTTx Market Position.** We hold a strong leadership position in the FTTx network access space. We offer customers an extensive choice of indoor and outdoor fiber demarcation and fully integrated smart gateways with telephone data, Power over Ethernet (“POE”), WiFi and over-the-top set-top box (“OTT STB”) capabilities and other service interfaces. In the FTTx optical line terminal (“OLT”) category, we offer a large portfolio of modular chassis, single platforms, and software for deployment in datacenter, central office, extended temperature environments and multi-dwelling unit (“MDU”) scenarios.
- **Technology Leadership.** We believe that our future success is built upon our investment in the development of advanced communications technologies. We 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 in collaboration with our leading Tier 1 carriers, innovating in environmentally hardened DWDM coherent optics and compact ROADM solutions to address emerging transport traffic needs, developing a new generation of SDN/NFV solutions for unified wired and wireless networks, upgrading our broadband access technology for 10 and 25/50/100 gigabyte access speeds, and introducing our cloud managed WiFi solutions and data analytics offerings. We also continue to expand and differentiate our portfolio through software investments in network orchestration, automation and slicing, a unified operating system and a subscriber experience software-as-a-service (SaaS) platform. Our software expansion and vision are designed to improve our long-term margin profile while differentiating DZS in the marketplace.
- **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 May 27, 2022, the Company acquired certain assets and liabilities of Adaptive Spectrum and Signal Alignment, Incorporated (“ASSIA”), an industry pioneer of broadband access quality-of-experience and service assurance software solutions (the “ASSIA Acquisition”). The core assets acquired include the CloudCheck® WiFi experience management and Expresse® access network optimization software solutions. These software solutions add powerful data analytics and network intelligence capabilities to DZS Cloud, including cloud-managed WiFi solutions, access network optimization and intelligent automation tools.

On March 3, 2021, the Company acquired substantially all of the assets of RIFT, Inc., a network automation solutions company, and all the outstanding shares of RIFT.IO India Private Limited, a wholly owned subsidiary of RIFT, Inc. (collectively “RIFT”). RIFT developed a carrier-grade software platform that simplifies the deployment of any slice, service, or application on any cloud.

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. This acquisition introduced the “O-Series” to the DZS portfolio of carrier grade optical networking products with 100 gigabits per second and above capability, expanding DZS product portfolios by providing environmentally hardened, high capacity, and flexible solutions at the network edge.

On January 3, 2019, we acquired Keymile to expand our business efforts in the EMEA. The acquired Multi-service Access Nodes (MSAN) portfolio complemented 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.

- **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

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 hundreds of carriers and service providers worldwide.

We also sell solutions indirectly to end customers through system integrators and distributors to the service providers, hospitality, education, stadiums, manufacturing and business enterprises as well as to the government and military.

For the year ended December 31, 2022, one customer represented 13% of net revenue. For the year ended December 31, 2021, two customers represented 19% and 12% of net revenue, respectively. For the year ended December 31, 2020, two customers represented 14% and 13% of net revenue, respectively

Research and Development

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

We have core research and development teams located in the United States, South Korea, Vietnam, India, Spain, and Canada. 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 viable revenue opportunities. We are continuing to refine our solution architecture, introducing new products using the various solutions we support, and creating additional interfaces and protocols for both domestic and international markets.

We are committed to investing in advanced technology research and development for new products and innovative solutions that align with our business strategy. Our research and product development expenses were \$56.1 million, \$47.0 million and \$38.0 million in 2022, 2021 and 2020, 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 and in other countries, and in connection with the ASSIA Acquisition, we also acquired a significant number of software patents. 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 70 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 sized 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. 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 and also manages our inside sales and sales engineering activities.
- **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 Pacific Sales.** This sales 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, in particular, 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.
- **Enterprise Sales.** Our Enterprise Sales organization includes global geographic coverage and is primarily focused on coverage of our FiberLAN solutions. The organization establishes and maintains direct and indirect relationships with enterprise customers for both greenfield (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, 2022, our backlog was approximately \$291.3 million, compared to \$225.0 million at December 31, 2021. 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 broadband connectivity, connected home and business, mobile and optical edge transport, and cloud software-based services. These markets are characterized by rapid change, converging technologies and a migration to solutions that offer advantages in both operational efficiency and service performance. These market factors represent both an opportunity and a competitive threat to us. We compete with numerous vendors in our core broadband connectivity and connected home and business markets, including ADTRAN, Calix, Huawei, Nokia, Ubiquiti, and ZTE, among others. In our FiberLAN business, which is a subset of our broadband connectivity and connected home and business market, our competitors include Cisco, Nokia, and Tellabs, among others. In our mobile and optical edge transport business, our competitors include Ciena, Cisco and Juniper Networks, among others. In our cloud software business, our competitors include solutions from ADTRAN, Calix, Ciena, Nokia, and Solarwinds. 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. Through 2022, our manufacturing process has used a strategic combination of procurement from qualified suppliers and in-house manufacturing in Seminole, Florida, USA. In October 2022, we announced an agreement with Fabrinet, a third-party provider of electro-mechanical and electronic manufacturing and distribution services, to transition the sourcing, procurement, order-fulfillment, manufacturing and return merchandise authorization activities in the Company's Seminole facility to Fabrinet. The transition began in October 2022 and substantially completed in the beginning of 2023, whereupon the Company no longer manufactures the products it sells. We have also relied and will continue to rely on other contract manufacturers, primarily located in China and South Korea, 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 outbreak of the coronavirus in China and other countries has negatively impacted our supply chain in recent months. Supply chain pricing, freight and logistics costs, availability, and extended lead-times became a challenge in 2021 as the world economy recovered from the COVID-19 pandemic and such challenges continued in to 2022. As we continue to incur elevated costs for components and expedite fees, our supply chain and operations teams continue to focus on managing through a constrained environment, thereby enabling DZS to maximize shipments despite elongated lead times. We remain cautious about continued supply chain headwinds that challenge the industry and anticipate a constrained supply chain environment to persist throughout 2023.

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.

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, 2022, we employed over 765 personnel 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 our investor website, we make 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 previously adversely affected significant portions of our business and could have a material adverse effect on our financial condition and results of operations. The emergence of the Omicron and subsequent variants beginning in late 2021 with a resulting increase in COVID cases in 2022 resulted in re-implementation of various measures, including shutdowns, travel bans and restrictions, limitations on public and private gatherings, business and port closures or operating restrictions, social distancing, and shelter-in-place orders in certain regions around the world. 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. We have operations in the United States, South Korea, Japan, Vietnam, India, Spain, and Canada as well as in other countries in Europe, Asia-Pacific, Middle East and Latin America, and each of these countries has taken varied measures in response to the pandemic. Restrictions on our manufacturing or support operations or workforce, similar limitations for our suppliers, and transportation restrictions or disruptions could limit our ability to meet customer demand and could have a material adverse effect on our financial condition and results of operations. Our customers have experienced, and may in the future experience, disruptions in their operations and supply chains, which can result in delayed, reduced, or cancelled orders, or collection risks, and which may adversely affect our results of operations.

We have experienced and continue to experience disruptions in our supply chain due to the impact of the COVID-19 pandemic, which has also impacted and may adversely impact our operations (including, without limitation, logistical and other operational costs) and the operations of some of our key suppliers. Supply chain pricing, freight and logistics costs, product and component availability, and extended lead-times became a challenge in 2021 and continued into 2022. If our vendors for product components are unable to meet our cost, quality, supply and transportation requirements, continue to remain financially viable or fulfill their contractual commitments and obligations, we could experience disruption in our supply chain, including shortages in supply or increases in production costs, which would materially adversely affect our results of operations. The current worldwide shortage of semiconductors and continued inflation may exacerbate these risks.

The pandemic has significantly increased economic and demand uncertainty and has led to volatility in capital markets and credit markets. Adverse changes in economic conditions related to the COVID-19 pandemic can significantly harm demand for our products and make it more challenging to forecast our operating results. Given the continued and substantial economic uncertainty and volatility created by the pandemic, it is difficult to predict the nature and extent of impacts on demand for our products.

The degree to which COVID-19 impacts our results will depend on future developments, which are highly uncertain and cannot be predicted, including the duration and severity of the pandemic; the actions taken to contain the virus or treat its impact; other actions taken by governments, businesses, and individuals in response to the virus and resulting economic disruption; and how quickly and to what extent normal economic and operating conditions can resume. Additional impacts and risks may arise that we are not aware of or able to respond to effectively. We are similarly unable to predict the extent of the impact of the pandemic on our customers, suppliers, and other partners, but a material effect on these parties could also materially adversely affect us. The impact of COVID-19 can also exacerbate other risks discussed in this Risk Factors section and throughout this report.

Risks Related to our Liquidity

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

As of December 31, 2022, we had approximately \$34.3 million in unrestricted cash and cash equivalents, including \$11.3 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) limitations on our ability to adequately plan for, or react to, changes in our business and industry; and (iii) 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; (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 \$37.4 million, \$34.7 million and \$23.1 million for the years ended December 31, 2022, 2021, and 2020, respectively. Additionally, we have incurred significant losses in prior years. We have an accumulated deficit of \$124.8 million as of December 31, 2022. We expect that we will continue to incur substantial product cost, 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 achieve 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 achieve profitability in future periods, we may continue to incur operating losses, which could be substantial, and our stock price could decline.

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. The impact of the COVID-19 pandemic on our supply chain has increased the volatility of our deployment timeframes. 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. Additionally, a weaker global economy could cause some of these service providers to delay or cancel planned capital expenditures. 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 may occasionally build up in inventory in response to these supply chain issues which increases the risk of inventory obsolescence. The current worldwide shortage of semiconductors may exacerbate these risks.

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 South Korea, Japan, Vietnam, India, Spain, and Canada, 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 the ongoing military conflict between Russia and Ukraine and China-Taiwan tensions; (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, Vietnam, India, Spain, and Canada, as well as in other countries in Europe, Asia-Pacific, 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

DASAN Networks, Inc. (“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, 2022, DNI owned approximately 29.4% 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. 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, 2022 was approximately 111,000 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 9.1 million shares of our common stock as of December 31, 2022 and such shares are registered with the SEC for resale. These shares are 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 2022, we entered into a Credit Agreement, as amended from time to time, (the “Credit Agreement”) by and between the Company, as borrower, certain subsidiaries of the Company, as guarantors, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent, which provided for Revolving Credit Facility in an aggregate principal amount of up to \$30.0 million. On May 27, 2022, the Company entered into a First Amendment to Credit Agreement (the “Amendment”), which, among other things, provides for a Term Loan in an aggregate principal amount of \$25.0 million. Refer to Note 8 Debt, in the Notes to Consolidated Financial Statements, for more detail. In November 2022 and January 2021, we also raised approximately \$30.8 million and \$59.5 million, respectively, in separate equity offerings. Refer to Note 9 Stockholders’ Equity, in the Notes to 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. Any debt financing secured by us in the future could become more expensive due to rising interest rates or involve restrictive covenants relating to our capital-raising activities and other financial and operational matters, which may make it more difficult for us to obtain additional capital. 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 level of indebtedness could adversely affect our business, operations, financial condition, and liquidity

In 2022, we entered into the Credit Agreement and the Amendment by and between the Company, as borrower, certain subsidiaries of the Company, as guarantors, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent. On October 31, 2022, DASAN Network Solutions, Inc., a corporation organized under the laws of the Republic of Korea, and an indirect, wholly-owned subsidiary of the Company (“DNS Korea”), entered into a Loan Agreement with Dasan Networks, Inc. (“DNI”), pursuant to which DNS Korea borrowed KRW 7.2 billion (\$5.0 million USD) from DNI (the “November 2022 DNI Loan”). In the first quarter of 2023, the entire outstanding balance on this term loans was repaid and DNS Korea entered into a new short-term loan arrangement with DNI (the “February 2023 DNI Loan”) and borrowed KRW 5 billion (\$4.1 million USD).

As of December 31, 2022, the Company's debt obligation under the Term Loan was \$24.1 million, net of unamortized issuance cost of \$0.3 million. The Company had \$4.0 million outstanding borrowings and \$0.1 million in letters of credit issued under the \$30.0 million Revolving Credit Facility as of December 31, 2022. The Company's debt obligation under the November 2022 DNI Loan was KRW 7.2 billion (\$5.7 million USD) as of December 31, 2022. We may incur additional indebtedness in the future, including additional borrowings under the Credit Agreement or other future credit facilities with other financial institutions or DNI.

Even if we are able to obtain new financing upon a default under the Credit Agreement and the February 2023 DNI Loan, it may not be on commercially reasonable terms or on terms that are acceptable to us. The level of indebtedness could have important consequences and could materially and adversely affect us in a number of ways, including:

- limiting our ability to obtain additional financing in the future for working capital, capital expenditures, acquisitions or general corporate purposes;
- limiting our flexibility to plan for, or react to, changes in our business or market conditions;
- requiring us to use a significant portion of any future cash flow from operations to repay or service the debt, thereby reducing the amount of cash available for other purposes;
- making us more highly leveraged than some of our competitors, which could place us at a competitive disadvantage; and
- making us more vulnerable to the impact of adverse economic and industry conditions and increases in interest rates.

The Credit Agreement, the February 2023 DNI Loan and the instruments governing our other indebtedness contain certain covenants, limitations, and conditions with respect to the Company that could restrict our ability to operate our business. The covenants include a maximum leverage ratio, a minimum fixed charge coverage ratio, a minimum liquidity covenant and minimum EBITDA, as well as financial reporting obligations, and usual and customary events of default. On February 15, 2023, the Company entered into a Second Amendment to Credit Agreement (the "Second Amendment"), which amends the Credit Agreement dated February 9, 2022 (as previously amended on May 27, 2022). The Second Amendment, among other things, suspends certain financial covenants until the fiscal quarter ending September 30, 2023. If an event of default occurs under the Credit Agreement or the February 2023 DNI Loan, as applicable, the agent and the lenders will be entitled to take various actions, including requiring the immediate repayment of all outstanding amounts, terminating commitments to make additional advances and selling our assets to satisfy the obligations under the outstanding indebtedness.

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

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

Our 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 ASSIA in 2022, 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 ASSIA'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 ongoing 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.

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.

Through 2022, we have relied on contract manufacturers to perform a portion of the manufacturing operations for our products. In October 2022, we announced an agreement with Fabrinet, a third-party provider of electro-mechanical and electronic

manufacturing and distribution services, to transition the sourcing, procurement, order-fulfillment, manufacturing and return merchandise authorization activities in the Company's Seminole, Florida facility to Fabrinet. The transition began in October 2022 and substantially completed in the beginning of 2023, whereupon the Company no longer manufactures its products. Fabrinet and other contract manufacturers we utilize 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.

We face supply chain risk, and our failure to estimate customer demand properly could result in excess or obsolete component inventories that could adversely affect our gross margins.

We have experienced, and may continue to experience supply shortages, or delays 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. During 2021 and 2022, we experienced disruptions in our supply chain, and we anticipate that such disruptions will continue in 2023. These supply issues have limited our ability to supply demand of certain customers. It is difficult to predict the future impact of these ongoing supply issues. 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, 2022, no customers represented more than 10% of net accounts receivable. As of December 31, 2022 the Company has an allowance for doubtful account of \$13.1 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 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 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.

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 and restricted stock units, 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 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.

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 worked remotely, and future 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.

We have identified a material weakness in our internal control over financial reporting, and our business may be adversely affected if we do not remediate this material weakness, or if we have other material weaknesses or significant deficiencies in our internal control over financial reporting in the future.

In connection with their evaluation of our disclosure controls and procedures, our chief executive officer (“CEO”) and chief financial officer (“CFO”) concluded that a material weakness exists in our internal control over financial reporting. This material weakness relates to a misapplication of U.S. generally accepted accounting principles related to revenue recognition for a sales agreement with an existing customer which was subject to unique terms. Specifically, the Company’s processes, procedures and controls related to financial reporting were not effective to ensure there was comprehensive analysis, documentation and accounting review of relevant facts in connection with revenue recognition related to such transaction. We have identified a number of measures to strengthen our internal control over financial reporting and address the material weakness that we identified and corrected prior to issuance of the related financial statements. (See Item 9A. *Controls and Procedures* contained in this report). The existence of one or more material weaknesses or significant deficiencies could result in errors in our financial statements, and substantial costs and resources may be required to rectify any internal control deficiencies. If we cannot produce reliable financial reports, investors could lose confidence in our reported financial information, we may be unable to obtain additional financing to operate and expand our business and our business and financial condition could be harmed.

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, inflation, 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 is located in Plano, Texas, we have development centers in the U.S., South Korea, Vietnam, India, Spain, and Canada and our manufacturing partners are primarily located in the U.S., China and South Korea. These facilities are 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 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

In 2020, the Company moved its headquarter and established its Engineering Center of Excellence in Plano, Texas, U.S, where we lease office space. We lease facilities for manufacturing in Seminole, Florida, U.S., where we previously manufactured our low volume, high mix products. In October 2022, we started a transition of the manufacturing to Fabrinet, which was substantially completed in the beginning of 2023, whereupon the Company no longer manufactures its products. We also lease facilities for office and warehouse space in South Korea and India, and maintain offices to provide sales and customer support at various domestic and international locations. 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, 2022.

Name	Age	Position
Charles Daniel Vogt	59	Chief Executive Officer, President
Misty Kawecki	49	Chief Financial Officer
Justin Ferguson	45	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. 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. 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.

Misty Kawecki was appointed to the position of Chief Financial Officer on August 2, 2021. Ms. Kawecki most recently served as Chief Financial Officer and Head of Operations at MediaKind, Inc., a large-scale media platform. Prior roles include Chief Accounting Officer at Imagine Communications, Inc., and executive roles at GENBAND (today known as Ribbon Communications) and McAfee (today is a subsidiary of Intel Corporation). She began her career at Ernst & Young LLP. She is a Certified Public Accountant and holds a Master's Degree in accounting from Texas Tech University.

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 1, 2023, we had 379 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.

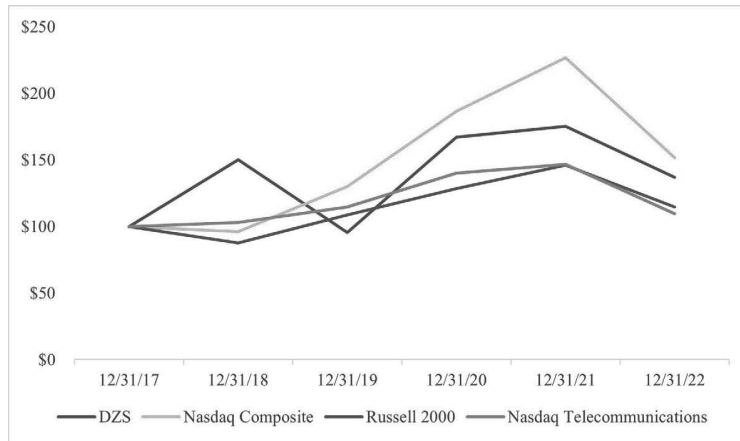
Dividend Policy

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.

Stock Performance Graph

The following graph and accompanying data compare the cumulative total return on our common stock with the cumulative total return of the Total Return Index for The NASDAQ Composite Market (U.S. Companies), the NASDAQ Telecommunications Index, and Russell 2000 Index for the five-year period ended December 31, 2022. The stock price performance shown on the graph below is not necessarily indicative of future price performance. This graph is not deemed to be “soliciting material” or “filed” with the SEC or subject to the liabilities of Section 18 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and the graph shall not be deemed to be incorporated by reference into any prior or subsequent filing by us under the Securities Act of 1933, as amended, or the Exchange Act.

Total return values were calculated based on cumulative total return assuming \$100 invested on December 31, 2017 in DZS Inc. common stock, the Total Return Index for the NASDAQ Composite Market (U.S. companies), the NASDAQ Telecommunications Index, and Russell 2000 Index.



ITEM 6. [RESERVED]

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

We are a global provider of access and optical networking infrastructure and cloud software solutions that enable the emerging hyper-connected, hyper-broadband world and broadband experiences. The Company provides a wide array of reliable, cost-effective networking technologies and software to a diverse customer base.

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.

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;
- Minimizing consumption of our cash and cash equivalents; and
- Improving gross margin through a wide range of initiatives, including an increase in the mix of recurring software revenue and reducing fixed costs by outsourcing manufacturing.

2022 Highlights and Recent Developments

On February 9, 2022, the Company entered into a Credit Agreement by and between the Company, as borrower, certain subsidiaries of the Company, as guarantors, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent. The Credit Agreement originally provided for revolving loans in an aggregate principal amount of up to \$30.0 million, up to \$15.0 million of which is available for letters of credit, and was scheduled to mature on February 9, 2024. On May 27, 2022, the Company entered into a First Amendment to Credit Agreement, which amends the Credit Agreement dated February 9, 2022 and provides, among other things, for a Term Loan in an aggregate principal amount of \$25.0 million with a maturity date of May 27, 2027 and extends the maturity date of the \$30.0 million Revolving Credit Facility to May 27, 2025. On May 27, 2022, the Company borrowed the full amount of the Term Loan to finance the ASSIA Acquisition discussed below. During year ended December 31, 2022, the Company borrowed \$22.0 million and repaid \$18.0 million under the revolving facility. On February 15, 2023, the Company entered into a Second Amendment to Credit Agreement (the “Second Amendment”), which amends the Credit Agreement dated February 9, 2022 (as previously amended on May 27, 2022) and, among other things, modifies certain financial covenants. Refer to Note 8 Debt, in the Notes to Consolidated Financial Statements, for further information on the Second Amendment.

On May 27, 2022, the Company acquired certain assets and liabilities of ASSIA, an industry pioneer of broadband access quality-of-experience software solutions. The core assets acquired include the CloudCheck® WiFi experience management and Expresse® access network optimization software solutions. These software solutions add powerful data analytics and network intelligence capabilities to DZS Cloud, including cloud-managed WiFi solutions, access network optimization and intelligent automation tools. The initial purchase consideration was \$25.0 million, including a \$2.5 million holdback that will be released 13 months following the transaction close date. In October 2022, the Company agreed to pay an additional \$1.35 million of purchase consideration to settle certain unresolved matters related to the ASSIA acquisition.

On September 17, 2022, DZS signed an agreement with Fabrinet, a third-party provider of electro-mechanical and electronic manufacturing and distribution services, to transition the sourcing, procurement, order-fulfillment, manufacturing and return merchandise authorization activities in the Company’s Seminole, Florida facility to Fabrinet. The agreement was announced on October 4, 2022. The transition to Fabrinet began in October 2022 and substantially completed in the beginning of 2023. Post transition, the DZS Seminole, Florida-based operations, supply chain and manufacturing workforce will be reduced by approximately two-thirds and the remaining team will be relocated to an appropriately sized facility.

On November 16, 2022, we entered into an underwriting agreement to sell 2.9 million shares of Common Stock (including 0.4 million shares issued pursuant to the underwriters’ option to purchase additional shares) at a price of \$11.50 per share in an underwritten public offering. The equity offering closed on November 21, 2022 and resulted in gross proceeds of approximately \$33.2 million and net proceeds, after deducting underwriting discounts and commissions and offering expenses, of approximately \$30.8 million.

Trends and Uncertainties

Over the last few years, the world has experienced a significant demand for mobile and fixed network access solutions and communications equipment that enable or support access to higher speed bandwidth access to the internet. The demand 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. We are benefiting from these shifts in business and consumer behaviors, that represent positive, long-term opportunities for our business.

In the face of extraordinary demand across a range of industries and the impact of the COVID-19 pandemic, global supply for certain raw materials and components used in our products has experienced substantial constraint and disruption in recent periods. The current worldwide shortage of semiconductors and continued inflation have exacerbated these risks. Supply chain pricing, freight and logistics costs, product and component availability, and extended lead-times became a challenge in 2021 and continue into 2022 as the world economy recovers from the COVID-19 pandemic. We have experienced and continue to experience disruptions in our supply chain, which has adversely impacted our operations and the operations of some of our key suppliers.

We conduct significant business in South Korea, Japan, Vietnam, India, Spain, and Canada, as well as in other countries in Europe, Asia-Pacific, Middle East and Latin America, all of which subject us to foreign currency exchange rate risk. The local currencies of our significant foreign subsidiaries are the South Korean Won ("KRW"), Japanese Yen ("JPY"), Euro ("EUR"), and Pound Sterling ("GBP"). Revenues and operating expenses are typically denominated in the local currency of each country and result from transactions by our operations in these countries. However, a significant portion of our international cost of sales is denominated in the U.S. Dollar ("USD"). During 2022, the USD appreciated significantly against the KRW, JPY, EUR and GBP which reduced the translated revenues, cost of sales and operating expenses transacted in local currencies, but not the USD based cost of sales, resulting in compressed margins and lower profitability. Late in 2022, exchange rates for these currencies returned to rates more comparable to historical rates.

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, 2022.

FINANCIAL PERFORMANCE

Consolidated Results of Operations

The table below presents the historical consolidated statement of comprehensive income (loss) as a percentage of revenues and year-over-year changes (in thousands except percent change).

	Years ended December 31,						Increase (Decrease)	
	2022	% of net revenue	2021	% of net revenue	2020	% of net revenue	from 2021 to 2022	from 2020 to 2021
Net revenue	\$ 375,691	100%	\$ 350,206	100%	\$ 300,640	100%	7.3%	16.5%
Cost of revenue	257,335	68%	229,938	66%	203,761	68%	11.9%	12.8%
Gross profit	118,356	32%	120,268	34%	96,879	32%	(1.6)%	24.1%
Operating expenses:								
Research and product development	56,124	15%	47,052	13%	37,957	12%	19.3%	24.0%
Selling, marketing, general and administrative	85,371	23%	90,241	26%	63,543	21%	(5.4)%	42.0%
Restructuring and other charges	4,617	1%	12,310	4%	—	—	(62.5)%	100.0%
Impairment of long-lived assets	827	—	1,735	1%	6,472	2%	(52.3)%	(73.2)%
Amortization of intangible assets	3,570	1%	1,182	—	1,432	1%	202.0%	(17.5)%
Total operating expenses	150,509	40%	152,520	44%	109,404	36%	(1.3)%	39.4%
Operating loss	(32,153)	(9)%	(32,252)	(10)%	(12,525)	(4)%	(0.3)%	157.5%
Interest expense, net	(1,442)	—	(238)	—	(1,958)	(1)%	505.9%	(87.8)%
Loss on extinguishment of debt	—	—	—	—	(1,369)	(1)%	—	(100.0)%
Other income (expense), net	(1,837)	—	1,020	1%	(3,729)	(1)%	(280.1)%	(127.4)%
Loss before income taxes	(35,432)	(9)%	(31,470)	(9)%	(19,581)	(7)%	12.6%	60.7%
Income tax provision	1,999	1%	3,213	1%	3,501	1%	(37.8)%	(8.2)%
Net loss	\$ (37,431)	(10)%	\$ (34,683)	(10)%	\$ (23,082)	(8)%	7.9%	50.3%

Net Revenue

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

	Years ended December 31,			Increase (Decrease)	
	2022	2021	2020	from 2021 to 2022	from 2020 to 2021
Products	\$ 335.3	\$ 330.1	\$ 281.0	1.6%	17.5%
Services and software	40.4	20.1	19.6	101.0%	2.6%
Total	\$ 375.7	\$ 350.2	\$ 300.6	7.3%	16.5%

Our product revenue represents revenue from sales of access networking infrastructure products including Access Edge, Optical Edge, and Subscriber Edge network solutions. Our services and software revenue represents revenue from maintenance and other professional services associated with product shipments and our Cloud Software solutions including DZS Xtreme, Expresse and CloudCheck software.

Our revenues increased 7.3% or \$25.5 million to \$375.7 million for 2022 compared to \$350.2 million for 2021. The increase in product revenue during the period was attributable to increased sales of access networking infrastructure solutions across different product portfolios. The increase in service and software revenue was primarily due to the increased product and software sales and revenue related to the ASSIA Acquisition, partially offset by the negative impact of foreign exchange fluctuations, particularly related to revenue recorded in our South Korean and Japanese entities.

Our revenues increased 16.5% or \$49.6 million to \$350.2 million for 2021 compared to \$300.6 million for 2020. The increase in product revenue during the period was attributable to increased sales of access networking infrastructure solutions across different product portfolios and partly as a result of recovering from the impacts of the COVID-19 pandemic in 2020. The increase in service revenue was primarily due to the increased product sales.

Our sales growth over the last few years has been positively impacted by new and existing customer demand aligned with the global GPON/XGS-PON upgrade cycle, market share gains in North America and Europe, Optical Edge and Middle Mile Broadband Network opportunities, and share capture resulting from Chinese equipment replacement initiatives. Our product revenue growth in 2023 will be influenced by our ability to secure the necessary semiconductors and components to support our backlog and market demand. We anticipate our software sales to increase in 2023 as we realize a full-year of recurring software revenue from the ASSIA Acquisition.

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

	Years ended December 31,			Increase (Decrease)	
	2022	2021	2020	from 2021 to 2022	from 2020 to 2021
Americas	\$ 107.4	\$ 101.5	\$ 61.9	5.8%	64.0%
Europe, Middle East, Africa	79.3	70.0	64.6	13.3%	8.4%
Asia	189.0	178.7	174.1	5.8%	2.6%
Total	<u>\$ 375.7</u>	<u>\$ 350.2</u>	<u>\$ 300.6</u>	<u>7.3%</u>	<u>16.5%</u>

Our geographic diversification reflects the combination of market demand, a strategic focus on capturing market share through new customer wins and new product introductions. As we have strategically expanded our revenue mix in North America over the past year, we continue to leverage our strength in the Asia market, particularly with Tier 1 customers in South Korea and Japan.

The increase in net revenue in both 2022 and 2021 was attributable to increased revenue in all regions driven by increased spending levels from our major customers and new customers capture. Additionally, the ASSIA Acquisition contributed \$18.1 million to our revenue growth in 2022.

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 across the regions.

Cost of Revenue and Gross Profit

Total cost of revenue increased 11.9% to \$257.3 million for 2022, compared to \$229.9 million for 2021. Total cost of revenue was 68.5% of net revenue for 2022, compared to 65.7% of net revenue for 2021, which resulted in a decrease in gross profit percentage to 31.5% for 2022 from 34.3% for 2021. The increase in total cost of revenue was primarily due to the increase in sales volume combined with fees paid to expedite certain product components. The gross profit percentage decrease was primarily due to the change in number and mix of products sold, including the geographic mix of those sales, negative exchange rate impacts on revenues and such expedite fees, which was partially offset by the software sales related to the ASSIA Acquisition.

Total cost of revenue increased 12.8% to \$229.9 million for 2021, compared to \$203.8 million for 2020. Total cost of revenue was 65.7% of net revenue for 2021, compared to 67.8% of net revenue for 2020, which resulted in an increase in gross profit percentage to 34.3% for 2021 from 32.2% for 2020. The increase in total cost of revenue was primarily due to the increase in sales volume. The gross profit improvement was primarily due to our strategic investments and geographic diversification decisions directed towards the higher margin North America region, despite increased supply chain costs.

We anticipate our gross margin to improve in 2023 as we realize a full-year of recurring software revenue from the ASSIA Acquisition, a higher proportion of revenue contribution from North America and EMEA, operating cost savings and product cost improvement resulting from our contract manufacturing transition to Fabrinet, from price increases implemented in 2021 and 2022, and a more stable foreign exchange environment.

Operating expenses

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 increased by 19.3% to \$56.1 million for 2022 compared to \$47.0 million for 2021. The increase in research and product development expenses was primarily due to strategic hiring decisions in research, development, and product line management with the intent to accelerate growth and capture market share and the ASSIA Acquisition.

Research and product development expenses increased by 24.0% to \$47.0 million for 2021 compared to \$38.0 million for 2020. The increase in research and product development expenses was primarily due to strategic hiring decisions in research, development, and product line management with the intent to accelerate growth and capture market share.

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 decreased by 5.4% to \$85.4 million for 2022 compared to \$90.2 million for 2021. The decrease was primarily due to \$14.2 million of bad debt expense recorded in the first quarter of 2021 for one customer in India. Refer to Note 1, in the Notes to Consolidated Financial Statements, for further information on the bad debt expense. The above impact was partially offset by higher stock-based compensation and strategic hiring decisions across sales and administration with the intent to accelerate growth and capture market share, along with the impact of the ASSIA Acquisition.

Selling, marketing, general and administrative expenses increased by 42.0% to \$90.2 million for 2021 compared to \$63.5 million for 2020. 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 of \$14.2 million in the first quarter of 2021. Refer to Note 1, in the Notes to Consolidated Financial Statements, for further information on the bad debt expense. The increase was also partially due to strategic hiring decisions across sales and administration with the intent to accelerate growth and capture market share, along with the impact of the Optelian and Rift acquisitions.

Restructuring and Other Charges: Restructuring and other charges for 2022 and 2021 related primarily to the strategic decisions in the third quarter of 2022 to outsource manufacturing from the Company's Seminole, Florida facility to Fabrinet, and in 2021, to transition DZS GmbH and Optelian to sales and research and development centers. In 2022, restructuring and other charges primarily related to the Fabrinet transition, including accelerated depreciation of manufacturing and facility related assets of \$1.3 million, termination-related benefits of \$0.7 million, loss on inventory sold to Fabrinet of \$0.5 million, and other costs of \$0.9 million. The Company recorded \$0.8 million of restructuring costs related to DZS GmbH and Optelian, consisting primarily of logistics costs and professional services. The Company also included in restructuring and other charges approximately \$0.4 million of implementation costs related to the Company's new enterprise resource planning and reporting software. In 2021, restructuring and other charges consisted of termination-related benefits of \$8.5 million, an impairment of long-lived assets charge of \$2.7 million mainly related to right-of-use assets from operating leases, professional services of \$0.9 million, and \$0.2 million of other charges. See Note 6 Restructuring and Other Charges, in the Notes to Consolidated Financial Statements, for further information.

Impairment of Long-Lived Assets: During 2022, the Company recorded an impairment charge of \$0.8 million for the right-of use assets from operating leases in connection with vacating the office space in Redwood City, California, acquired in conjunction with ASSIA Acquisition. Following the acquisition, the Company made the decision to vacate the space in Redwood City and to adopt a remote work policy in the region. During 2021, the Company recorded an impairment charge of \$1.7 million for the right-of use assets from operating leases in connection with the relocation of the headquarters to Plano, Texas. See Note 13 Leases, in the Notes to Consolidated Financial Statements, for further information. During 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.

Interest Expense, net: Interest expense, net relates mainly to earnings from our cash and cash equivalents, interest expense associated with the credit facilities and amortization of debt issuance costs associated with obtaining such credit facilities. The Company recorded \$1.4 million, \$0.2 million and \$2.0 million of interest expense, net, in 2022, 2021, and 2020, respectively.

Loss on Extinguishment of Debt: 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 related charge in 2022 and 2021.

Other Income (Expense), net: Other income (expense), net relates mainly to realized and unrealized foreign exchange gains and losses. The Company recorded \$1.8 million net loss, \$1.0 million net gain, and \$3.7 million net loss in 2022, 2021, and 2020, respectively. The change in other income (expense), net was primarily due to foreign currency exchange rates fluctuation during the above periods.

Income Tax Provision (Benefit): We recorded an income tax expense of \$2.0 million for 2022 as compared to \$3.2 million and \$3.5 million expense incurred in 2021 and 2020, respectively. Despite consolidated net losses, we incur income tax expense due to taxable income generated in South Korea and Japan.

Information about our effective tax rate is summarized below (in thousands except tax rate):

	Years ended December 31,		
	2022	2021	2020
Income (loss) before income taxes	\$ (35,432)	\$ (31,470)	\$ (19,581)
Total tax provision (benefit)	1,999	3,213	3,501
Effective tax rate	-5.6%	-10.2%	-17.9%

NON-GAAP FINANCIAL 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) other income and expense, (iii) provision (benefit) for taxes, (iv) depreciation and amortization, (v) stock-based compensation, and (vi) the impact of material transactions or events that we believe are not indicative of our core operating performance, such as acquisition costs, impairment of goodwill, intangibles or long-lived assets, loss on debt extinguishment, legal costs related to certain litigation, restructuring and other charges, including termination related benefits, headquarters and facilities relocation, executive transition, and bad debt expense primarily 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.

During the third quarter of 2022, DZS revised its calculation of Adjusted EBITDA to exclude other income and expenses. Previously reported periods have been revised to confirm to current period presentation.

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):

	Years ended December 31,		
	2022	2021	2020
Net income (loss)	\$ (37,431)	\$ (34,683)	\$ (23,082)
Add (deduct):			
Interest expense, net	1,442	238	1,958
Other expense (income)*	1,837	(132)	3,729
Income tax provision (benefit)	1,999	3,213	3,501
Depreciation and amortization	7,125	4,551	5,143
Stock-based compensation	15,802	8,990	4,613
Loss on debt extinguishment	—	—	1,369
Headquarters and facilities relocation	827	1,114	61
Restructuring and other charges	4,617	12,310	—
Acquisition costs	1,150	675	—
Executive transition	927	372	2,047
Litigation	36	—	—
Intangibles Impairment	—	—	6,472
Bad debt expense, net of recoveries**	(1,153)	13,957	3,119
Adjusted EBITDA	<u>\$ (2,822)</u>	<u>\$ 10,605</u>	<u>\$ 8,930</u>

* For the year ended December 31, 2021, previously reported Adjusted EBITDA excluded a component of Other Income related to the lease termination in Alameda. The related amount is included in the Headquarters and facilities relocation line on the net income (loss) to Adjusted EBITDA reconciliation table and is not included in Other expense (income) here.

** Refer to Note 1, in the Notes to 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 equity sales.

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

	December 31, 2022	December 31, 2021
Unrestricted cash and cash equivalents	\$ 34,347	\$ 46,666
Working capital	86,526	124,498

As of December 31, 2022, we had \$86.5 million of working capital and \$34.3 million in unrestricted cash and cash equivalents, which included \$11.3 million in cash balances held by our international subsidiaries.

As of December 31, 2022, we had \$4.0 million outstanding borrowings and \$0.1 million in letters of credit issued under the \$30.0 million Revolving Credit Facility, and \$25.9 million was available to the Company for additional borrowings.

On November 21, 2022, the Company closed an equity offering which resulted in net proceeds to the Company of approximately \$30.8 million. We expect to use the net proceeds from the public equity offering to fund all or a portion of the costs of any strategic acquisitions we determine to pursue in the future, to finance the growth of our business and for working capital and other general corporate purposes.

We continue to focus on cost management, operating efficiency and efficient discretionary spending to support our funding requirements. In addition, if necessary, we may leverage our Revolving Credit Facility or issue debt or equity securities. 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, supply chain disruptions, and foreign exchange fluctuations provide great uncertainty and significant risk with respect to a potential impact on our future operations.

The following table presents a summary of our cash flow activity for the periods set forth below (in thousands):

Consolidated Statements of Cash Flows Data	2022	Years ended December 31, 2021	2020
	Net cash provided by (used in) operating activities	\$ (50,898)	\$ (14,326)
Net cash used in investing activities	(28,014)	(9,483)	(2,270)
Net cash provided by financing activities	64,768	23,778	17,624
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(1,031)	(917)	534
Net change in cash, cash equivalents and restricted cash	<u>(15,175)</u>	<u>(948)</u>	<u>20,952</u>
Cash, cash equivalents and restricted cash at beginning of period	53,639	54,587	33,635
Cash, cash equivalents and restricted cash at end of period	<u>\$ 38,464</u>	<u>\$ 53,639</u>	<u>\$ 54,587</u>

Operating Activities

Net cash used in operating activities during 2022 was \$50.9 million compared with \$14.3 million net cash used in operating activities during 2021. The increase in cash used in operating activities was primarily due to an increase in accounts receivable as shipments were heavily weighted toward the last month of the fourth quarter of 2022 due to component availability, and an increase in inventory purchases in anticipation of increased shipments in 2023 and as a mitigation against long lead times.

Net cash used in operating activities during 2021 was \$14.3 million compared with \$5.1 million net cash provided by operating activities during 2020. The increase in cash used in operating activities was primarily due to restructuring activities related to our Hanover location, an increase in research and development expenses, along with an increase in selling, general and administrative expenses, partially offset by an increase in gross margin.

Investing Activities

Net cash used in investing activities during 2022 was \$28.0 million compared with \$9.5 million of net cash used in investing activities during 2021. This increase was primarily due to cash used in the ASSIA Acquisition in the second quarter of 2022.

Net cash used in investing activities during 2021 was \$9.5 million compared with \$2.3 million of net cash used in investing activities during 2020. The increase was primarily due to cash used for the Optelian and RIFT acquisitions.

Financing Activities

Net cash provided by financing activities during 2022 was \$64.8 million and consisted primarily of proceeds from the equity offering, borrowing under the term loan to fund the ASSIA Acquisition, net drawings on Revolving Credit Facility, a related party term loan discussed in Note 12 to the Consolidated Financial Statements, and proceeds from exercise of stock awards, partially offset by payments of debt issuance cost and contingent consideration for the Optelian Acquisition.

Net cash provided by financing activities during 2021 was \$23.8 million and consisted primarily of proceeds from the equity offering, proceeds from exercise of stock options and employee stock purchases partially offset by repayments of our short-term borrowings and related party term loans.

Net cash provided by financing activities during 2020 was \$17.6 million and consisted primarily of proceeds from borrowings, proceeds from factored accounts receivable and proceeds from exercise of stock options and employee stock purchases, partially offset by a net outflow associated with the repayment of short-term borrowings and long-term debt.

Debt Facilities

On February 9, 2022, the Company entered into a Credit Agreement by and between the Company, as borrower, certain subsidiaries of the Company, as guarantors, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent. The Credit Agreement originally provided for revolving loans in an aggregate principal amount of up to \$30.0 million, up to \$15.0 million of which is available for letters of credit, and was scheduled to mature on February 9, 2024. The maximum amount that the Company can borrow under the Credit Agreement is subject to a borrowing base, which is based on a percentage of eligible accounts receivable and eligible inventory, subject to reserves and other adjustments, plus \$10.0 million.

On May 27, 2022, the Company entered into a First Amendment to Credit Agreement, which amends the Credit Agreement dated February 9, 2022. The Amendment, among other things, provides for the Term Loan in an aggregate principal amount of \$25.0 million with a maturity date of May 27, 2027 and extends the maturity date of the \$30.0 million Revolving Credit Facility to May 27, 2025. On May 27, 2022, the Company borrowed the full amount of the Term Loan to finance the ASSIA Acquisition.

As of December 31, 2022, the Company's debt obligation was \$24.1 million, net of unamortized issuance costs of \$0.3 million and of which \$1.3 million is scheduled for payment in 2023. While we believe that we are likely to achieve results of operations which would ensure loan covenant compliance, due to the potential impact of the COVID-19 pandemic, supply chain disruptions and foreign exchange fluctuations, there is a risk of non-compliance in the next 12 months and, accordingly, we have classified the entire amount as a current liability. As of December 31, 2022, the Company had \$4.0 million outstanding borrowings and \$0.1 million in letters of credit issued under the \$30.0 million Revolving Credit Facility, and \$25.9 million was available to the Company for additional borrowing. Refer to Note 8 Debt, in the Notes to Consolidated Financial Statements, for more detail about our current and past debt obligations.

On February 15, 2023, the Company entered into a Second Amendment to Credit Agreement (the "Amendment"), which amends the Credit Agreement dated February 9, 2022 (as previously amended on May 27, 2022). The Amendment, among other things, (1) modifies the financial covenants to (i) suspend the maximum leverage ratio requirement of 2.50 to 1.00 until the fiscal quarter ending September 30, 2023 and (ii) suspend the minimum fixed charge coverage ratio requirement of 1.25 to 1.00 until the fiscal quarter ending December 31, 2023, (2) adds new financial covenants to require (i) minimum liquidity of \$30 million for the fiscal quarter ending March 31, 2023, \$35 million for the fiscal quarters ending June 30, 2023 and September 30, 2023, and \$20 million at any time until September 30, 2023, and (ii) minimum EBITDA (as defined in the Credit Facility) of (\$1 million) for the fiscal quarter ending March 31, 2023 and \$1 million for the fiscal quarter ending June 30, 2023, (3) increases the applicable margin for adjusted term SOFR borrowings and prime rate borrowings to 4.0% and 3.0%, respectively, when the Company's leverage ratio exceeds 2.50 to 1.00, (4) increases the commitment fee on the unused portion of the revolving commitment to 0.40% per year when the Company's leverage ratio exceeds 2.50 to 1.00, and (5) prohibits dividends and other distributions and tightens certain covenants.

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, 2022, no customers represented more than 10% of net accounts receivable. Refer to Note 1 Organization and Summary of Significant Accounting Policies, in the Notes to Consolidated Financial Statements, for further detail. Our receivables from customers in countries other than the U.S. represented 86% 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 obligations.

Contractual Commitments and Off-Balance Sheet Arrangements

As of December 31, 2022, our future contractual commitments included operating lease obligations and purchase commitments. Future minimum operating lease obligations were \$17.4 million and included operating lease payments for our office locations and manufacturing, research and development locations, which expire at various dates through 2028. Refer to Note 13 Leases, in the Notes to Consolidated Financial Statements, for more details. Our purchase order commitments were \$112.6 million and included inventory purchase commitments to our contract manufacturers and component suppliers. Refer to Note 14 Commitments and Contingencies, in the Notes to Consolidated Financial Statements, for more details.

The Company's pension plan obligations are excluded from the contractual commitments since the plan is unfunded, and the timing and amount of any cash payments are uncertain. Refer to Note 15 Employee Benefit Plans, in the Notes to Consolidated Financial Statements, for more details.

Critical Accounting Estimates

The methods, assumptions, and estimates that we use in applying our accounting policies may require us to apply judgments regarding matters that are inherently uncertain. We consider an accounting policy to be a critical estimate if: (1) we must make assumptions that were uncertain when the judgment was made, and (2) changes in the estimate assumptions, or selection of a different estimate methodology, could have a significant impact on our financial position and the results that we report in our Consolidated Financial Statements. While we believe that our estimates, assumptions, and judgments are reasonable, they are based on information available when the estimate was made.

Refer to Note 1 Accounting Policies, in the Notes to Consolidated Financial Statements, for further information on our critical accounting estimates and policies, which are as follows:

Revenue Recognition – the calculation of transaction price, net of variable consideration. Our sales arrangements to certain distributors provide our distributors with volume discounts, price adjustments, and other allowances under certain circumstances. For contracts with customers that contain multiple performance obligations, we account for the promises separately as individual performance obligations if they are distinct.

Inventories – the capitalization of manufacturing costs in inventory, excluding factory excess capacity costs. Inventory reflected at the lower of cost or net realizable value considering future demand and market conditions.

Goodwill and Long-lived Assets – the valuation methods and assumptions used in assessing the impairment of property, plant and equipment, identified intangibles, and goodwill, including the determination of asset groupings and the identification and allocation of goodwill to reporting units.

Business Combination – the valuation methods and assumptions used in assessing the fair value of assets and liabilities on the acquisition date.

Income Tax – the determination of deferred tax assets and liabilities based on differences between the financial reporting and the income tax bases of assets and liabilities. Valuation allowances are established, when necessary, to reduce deferred tax assets to the amount expected to be realized.

Allowances for Doubtful Accounts – the determination of expected credit losses through analysis of information obtained from credit rating agencies, financial statement review, and historical and current collection trends.

Pension Benefit Obligation – the valuation methods and assumptions used to measure the pension benefit obligation.

Item 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISKS

Market risk represents the risk of loss that may impact our financial position due to adverse changes in financial market prices and rates. Our market risk exposure is primarily a result of fluctuations in interest rates and foreign currency exchange risks. We do not hold or issue financial instruments for trading purposes.

Interest Rate Risk

We had unrestricted cash and cash equivalents of \$34.3 million and \$46.7 million at December 31, 2022 and December 31, 2021, respectively. We do not have material exposure to market risk with respect to investments, as our investments consist primarily of highly liquid investments purchased with original maturities of three months or less.

Our exposure to interest rate risk includes the amount of interest we must pay on our borrowings under our JPMorgan Credit Agreement. At the Company's option, amounts borrowed under the Credit Agreement, as amended, accrue interest at a per annum rate equal to either (i) the adjusted term SOFR rate plus a margin ranging from 3.0% to 4.0% per year or (ii) the prime rate plus a margin ranging from 2.0% to 3.0% per year, in each case depending on the Company's leverage ratio.

As of December 31, 2022, the Company's contractual debt obligation under the Term Loan was \$24.4 million. If the applicable variable interest rates changed by 200 basis points, our interest expense for 2022 would have decreased or increased by approximately \$0.3 million.

Foreign Currency Exchange Risk

We have foreign currency risks related to certain of our foreign subsidiaries, primarily in Korea, Japan, Germany, and the UK. Revenues and operating expenses are typically denominated in the local currency of each country and result from transactions by our operations in these countries. However, a significant portion of our international cost of sales is denominated in the U.S. Dollar. The local currencies of our foreign subsidiaries are the South Korean Won ("KRW"), Japanese Yen ("JPY"), Euro ("EUR"), and Pound Sterling ("GBP"), respectively. Fluctuations in foreign currencies create volatility in our reported results of operations. We estimate that U.S. Dollar ("USD") appreciation or depreciation of 10% relative to KRW, JPY, EUR and GBP would have led to a decrease or increase of our operating income for 2022 of approximately \$12.0 million, respectively.

Foreign exchange rate fluctuations may also adversely impact our financial position as the assets and liabilities of our foreign operations are translated into USD in preparing our consolidated balance sheets. The effect of foreign exchange rate fluctuations on our consolidated financial position for the year ended December 31, 2022 was a net translation loss of \$4.1 million. This loss is recognized as an adjustment to stockholders' equity through accumulated other comprehensive loss. If USD had appreciated or depreciated by 10% relative to KRW, JPY, EUR, and GBP, our net assets as of December 31, 2022 would have decreased or increased by approximately \$3.0 million, respectively.

We have certain assets and liabilities, primarily inter-company loans, that are denominated in currencies other than the relevant entity's functional currency. Our intercompany loans are primarily denominated in USD and EUR. Changes in the functional currency value of these balances create fluctuations in our reported consolidated financial position, cash flows and results of operations. Transaction gains and losses on these foreign currency denominated assets and liabilities are recognized each period within "Other income (expense), net" in our consolidated statement of comprehensive income (loss). During the year ended December 31, 2022, we recognized approximately \$1.2 million of expense related to the intercompany loans denominated in foreign currencies. If USD had appreciated or depreciated by 10% relative to EUR, our net income for 2022 would have decreased or increased by approximately \$2.0 million, respectively.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

DZS INC. AND SUBSIDIARIES

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

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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

To the Stockholders and the Board of Directors of DZS Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of DZS Inc. and subsidiaries (the Company) as of December 31, 2022 and 2021, the related consolidated statements of comprehensive income (loss), stockholders' equity and cash flows for each of the two years in the period ended December 31, 2022, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2022, in conformity with U.S. generally accepted accounting principles.

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, 2022, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated March 10, 2023 expressed an adverse opinion thereon.

Basis for Opinion

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

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

Critical Audit Matters

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

Deferred Tax Asset Valuation Allowance

Description of the Matter

As more fully described in Note 11, Income Taxes, as of December 31, 2022, the Company had deferred tax assets of \$53.1 million before a valuation allowance of \$49.0 million in the U.S. and foreign jurisdictions. Deferred tax assets are reduced by a valuation allowance if, based upon the weight of all available evidence, it is more likely than not that some portion, or all, of the deferred tax assets will not be realized. Management's analysis of the realizability of its deferred tax assets was critical to our audit because the assessment process by jurisdiction is complex, involves judgment, and includes assumptions that may be affected by future market or economic conditions.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's income tax process, including the Company's assessment of the realizability of deferred tax assets. This included testing controls over management's review of the valuation allowance position and the deferred tax rollforward by jurisdiction.

We evaluated the Company's assessment of the realizability of deferred tax assets, including management's evaluation of the sources of taxable income considered in determining whether a valuation allowance is required and management's assessment of all available evidence, both positive and negative, to determine the amount of the valuation allowance. Among other audit procedures performed, we involved our tax professionals to evaluate the application of tax law in the Company's assessment and the resulting valuation allowance. We also tested the Company's scheduling of the reversal of existing taxable temporary differences and evaluated the adequacy of the Company's financial statement disclosure in Note 11 to the consolidated financial statements related to this tax matter.

Risk and uncertainty related to forecasted debt covenant compliance

Description of the Matter

As described in Note 8, Debt, to the consolidated financial statement, at December 31, 2022, the Company's debt obligations under the Term Loan were \$24.1 million. The Company's Credit Agreement requires maintenance of certain financial covenants, including a leverage ratio, a fixed charge coverage ratio, minimum liquidity, and minimum EBITDA as defined in the Credit Agreement. Failure to maintain the covenants, or to obtain from the lenders a waiver of a covenant violation, would result in a default on the Credit Agreement. The Company has disclosed the risk of non-compliance with certain financial covenants in the next 12 months and presented the long-term debt obligations of \$22.8 million within the current portion of long-term debt as of December 31, 2022. Auditing management's assessment of the likelihood of compliance with the financial covenants within the one year after the balance sheet date was complex and highly judgmental. In particular, projections of adjusted EBITDA, as defined in the Credit Agreement, were sensitive to significant assumptions, primarily revenue growth rates and gross margin.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over management's assessment of projected compliance with the financial covenant of the Credit Agreement within one year after the balance sheet date, including the Company's sensitivity analysis considering historical performance, current macroeconomic trends and management's operating plan.

Our audit procedures included, among others, testing the significant assumption discussed above and the underlying data used by the Company in its forecast of adjusted EBITDA. For example, we compared the revenue growth rate and gross margin used by management to historical performance and current macroeconomics trends. We performed sensitivity analyses of certain significant assumptions to evaluate the changes in forecasted adjusted EBITDA and its effect on debt covenant compliance that would result from changes in the assumptions. We further evaluated management's disclosure in the consolidated financial statements regarding the risks and uncertainties associated with management's forecast.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2021.

Dallas, Texas
March 10, 2023

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
DZS Inc.

Opinion on the financial statements

We have audited the consolidated balance sheet of DZS Inc. (a Delaware corporation) and subsidiaries (the “Company”) as of December 31, 2020 (not presented herein), the related consolidated statements of comprehensive income (loss), stockholders’ equity, and cash flows for the year 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 the results of its operations and its cash flows for the year then ended, in conformity with accounting principles generally accepted in the United States of America.

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 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 the financial statements are free of material misstatement, whether due to error or fraud. Our audit 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 audit 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 audit provides a reasonable basis for our opinion.

/s/ GRANT THORNTON LLP

We served as the Company’s auditor from 2019 to 2021.

Dallas, Texas
March 11, 2021

DZS INC. AND SUBSIDIARIES
Consolidated Balance Sheets
(In thousands, except par value)

	As of December 31,	
	2022	2021
Assets		
Current assets:		
Cash and cash equivalents	\$ 34,347	\$ 46,666
Restricted cash	3,969	6,808
Accounts receivable – trade, net of allowance for doubtful accounts of \$16,184 as of December 31, 2022 and \$17,735 as of December 31, 2021	153,780	86,114
Other receivables	16,144	10,621
Inventories	78,513	56,893
Contract assets	576	2,184
Prepaid expenses and other current assets	8,371	5,690
Total current assets	295,700	214,976
Property, plant and equipment, net	9,478	9,842
Right-of-use assets from operating leases	12,606	12,640
Goodwill	19,952	6,145
Intangible assets, net	31,742	5,115
Other assets	15,536	8,950
Total assets	\$ 385,014	\$ 257,668
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable – trade	\$ 121,225	\$ 64,258
Short-term debt – bank, trade facilities and secured borrowings	9,706	—
Current portion of long-term debt	24,073	—
Contract liabilities	21,777	6,091
Operating lease liabilities	4,834	4,097
Accrued and other liabilities	27,559	16,032
Total current liabilities	209,174	90,478
Long-term debt	—	—
Contract liabilities – non-current	7,864	3,044
Operating lease liabilities – non-current	11,417	12,103
Pension liabilities	11,021	16,527
Other long-term liabilities	2,806	3,609
Total liabilities	242,282	125,761
Commitments and contingencies (Note 14)		
Stockholders' equity:		
Common stock, 36,000 shares authorized, 30,968 and 27,505 shares issued and outstanding as of December 31, 2022 and December 31, 2021, respectively, at \$0.001 par value	30	27
Additional paid-in capital	271,884	223,336
Accumulated other comprehensive loss	(4,351)	(4,457)
Accumulated deficit	(124,831)	(86,999)
Total stockholders' equity	142,732	131,907
Total liabilities and stockholders' equity	\$ 385,014	\$ 257,668

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,		
	2022	2021	2020
Net revenue	\$ 375,691	\$ 350,206	\$ 300,640
Cost of revenue	257,335	229,938	203,761
Gross profit	118,356	120,268	96,879
Operating expenses:			
Research and product development	56,124	47,052	37,957
Selling, marketing, general and administrative	85,371	90,241	63,543
Restructuring and other charges	4,617	12,310	—
Impairment of long-lived assets	827	1,735	6,472
Amortization of intangible assets	3,570	1,182	1,432
Total operating expenses	150,509	152,520	109,404
Operating loss	(32,153)	(32,252)	(12,525)
Interest expense, net	(1,442)	(238)	(1,958)
Loss on extinguishment of debt	—	—	(1,369)
Other income (expense), net	(1,837)	1,020	(3,729)
Loss before income taxes	(35,432)	(31,470)	(19,581)
Income tax provision	1,999	3,213	3,501
Net loss	(37,431)	(34,683)	(23,082)
Foreign currency translation adjustments (a)	(4,172)	(4,046)	2,796
Actuarial gain (loss)	4,278	1,713	(981)
Comprehensive loss	\$ (37,325)	\$ (37,016)	\$ (21,267)
Net loss per share			
Basic	\$ (1.33)	\$ (1.30)	\$ (1.07)
Diluted	\$ (1.33)	\$ (1.30)	\$ (1.07)
Weighted average shares outstanding			
Basic	28,085	26,692	21,588
Diluted	28,085	26,692	21,588

(a) Includes net loss of \$0.8 million, net loss of \$1.2 million, and net gain of \$1.4 million on intra-entity foreign currency transactions that are of a long-term investment nature for the years ended December 31, 2022, 2021, and 2020, respectively. Also includes \$0.1 million reclassification of foreign currency gain related to subsidiary dissolution to Other income (expense), net for the year ended December 31, 2022.

See accompanying notes to consolidated financial statements.

DZS INC. AND SUBSIDIARIES
Consolidated Statements of Stockholders' Equity
(In thousands)

	Common stock		Additional paid-in capital	Accumulated other comprehensive loss	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balance as of December 31, 2019	21,419	\$ 21	\$ 139,700	\$ (3,939)	\$ (29,234)	\$ 106,548
Exercise of stock awards and employee stock plan purchases, net of shares withheld for taxes	539	1	3,684	—	—	3,685
Stock-based compensation	—	—	4,613	—	—	4,613
Net income (loss)	—	—	—	—	(23,082)	(23,082)
Other comprehensive loss	—	—	—	1,815	—	1,815
Balance as of December 31, 2020	21,958	\$ 22	\$ 147,997	\$ (2,124)	\$ (52,316)	\$ 93,579
Issuance of common stock in public offering, net of issuance costs	4,600	5	59,520	—	—	59,525
Exercise of stock awards and employee stock plan purchases, net of shares withheld for taxes	947	—	6,829	—	—	6,829
Stock-based compensation	—	—	8,990	—	—	8,990
Net income (loss)	—	—	—	—	(34,683)	(34,683)
Other comprehensive loss	—	—	—	(2,333)	—	(2,333)
Balance as of December 31, 2021	27,505	\$ 27	\$ 223,336	\$ (4,457)	\$ (86,999)	\$ 131,907
Cumulative effect of ASC 326 adoption	—	—	—	—	(401)	(401)
Issuance of common stock in public offering, net of issuance costs	2,884	3	30,771	—	—	30,774
Exercise of stock awards and employee stock plan purchases, net of shares withheld for taxes	579	—	1,975	—	—	1,975
Stock-based compensation	—	—	15,802	—	—	15,802
Net income (loss)	—	—	—	—	(37,431)	(37,431)
Subsidiary dissolution	—	—	—	(68)	—	(68)
Other comprehensive loss	—	—	—	174	—	174
Balance as of December 31, 2022	30,968	\$ 30	\$ 271,884	\$ (4,351)	\$ (124,831)	\$ 142,732

See accompanying notes to consolidated financial statements.

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

	Years ended December 31,		
	2022	2021	2020
Cash flows from operating activities:			
Net loss	\$ (37,431)	\$ (34,683)	\$ (23,082)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation and amortization	8,429	4,551	5,143
Impairment of long-lived assets and non-cash restructuring	827	4,425	6,472
Gain on Lease termination	—	(908)	—
Loss on extinguishment of debt	—	—	1,343
Amortization of deferred financing costs	173	12	149
Stock-based compensation	15,802	8,990	4,613
Provision for inventory write-down	4,946	4,064	5,531
Bad debt expense, net of recoveries	(229)	14,491	3,833
Provision for sales returns	2,556	1,132	1,303
Provision for warranty	656	798	1,072
Unrealized loss (gain) on foreign currency transactions	448	335	2,875
Subsidiary dissolution	(68)	—	—
Loss (gain) of disposal of property, plant and equipment	(135)	(468)	18
Deferred taxes	—	1,329	316
Changes in operating assets and liabilities:			
Accounts receivable	(68,575)	(6,624)	(18,782)
Other receivable	(9,520)	(4,780)	822
Inventories	(28,219)	(23,241)	(6,916)
Contract assets	1,488	3,915	11,341
Prepaid expenses and other assets	(6,363)	(2,965)	703
Accounts payable	61,697	19,092	11,136
Contract liabilities	1,031	2,215	13
Accrued and other liabilities	1,589	(6,006)	(2,839)
Net cash provided by (used in) operating activities	(50,898)	(14,326)	5,064
Cash flows from investing activities:			
Proceeds from disposal of property, plant and equipment and other assets	165	561	—
Purchases of property, plant and equipment	(4,532)	(5,585)	(2,270)
Acquisition of business, net of cash acquired	(23,647)	(4,459)	—
Net cash used in investing activities	(28,014)	(9,483)	(2,270)
Cash flows from financing activities:			
Proceeds from issuance of common stock in public offerings, net of issuance costs	30,774	59,525	—
Proceeds from long-term borrowings	25,000	—	—
Repayments of long-term borrowings	(625)	—	(13,125)
Proceeds from short-term borrowings and line of credit, net	4,000	—	13,774
Repayments of short-term borrowings and line of credit, net	—	(13,278)	(16,696)
Proceeds from related party term loan	5,041	—	18,341
Repayments of related party term loan	—	(29,298)	—
Payments for debt issue costs	(839)	—	—
Payments of contingent consideration	(558)	—	—
Proceeds from factored accounts receivable	—	—	11,645
Proceeds from exercise of stock awards and employee stock plan purchases	1,975	6,829	3,685
Net cash provided by financing activities	64,768	23,778	17,624
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(1,031)	(917)	534
Net change in cash, cash equivalents and restricted cash	(15,175)	(948)	20,952
Cash, cash equivalents and restricted cash at beginning of period	53,639	54,587	33,635
Cash, cash equivalents and restricted cash at end of period	\$ 38,464	\$ 53,639	\$ 54,587
Reconciliation of cash, cash equivalents and restricted cash to statement of financial position			
Cash and cash equivalents	\$ 34,347	\$ 46,666	\$ 45,219
Restricted cash	3,969	6,808	9,200
Long-term restricted cash	148	165	168
	\$ 38,464	\$ 53,639	\$ 54,587
Supplemental disclosure of cash flow information:			
Cash paid during the period for:			
Interest – bank and trade facilities	\$ 1,177	\$ 83	\$ 788
Interest – related party	\$ 65	\$ 108	\$ 981
Income taxes	\$ 1,017	\$ 3,029	\$ 2,645

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 access and optical networking infrastructure and cloud software solutions that enable the emerging hyper-connected, hyper-broadband world and broadband experiences. The Company provides a wide array of reliable, cost-effective networking technologies and software 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 contract manufacturers located in the U.S., China, India, and Korea. The Company maintains offices to provide sales and customer support at global locations. Through 2022, we have also used our manufacturing facility in Seminole, Florida. In October 2022, we announced an agreement with Fabrinet, a third-party provider of electro-mechanical and electronic manufacturing and distribution services, to transition the sourcing, procurement, order-fulfillment, manufacturing and return merchandise authorization activities in the Company's Seminole facility to Fabrinet. The transition began in October 2022 and substantially completed in the beginning of 2023, whereupon the Company no longer manufactures its products.

On August 26, 2020, the Company filed a Certificate of Amendment to its Restated Certificate of Incorporation with the Delaware Secretary of State reflecting a company name change from Dasan Zhone Solutions, Inc. to DZS Inc.

(b) Basis of Presentation

The consolidated financial statements are prepared in accordance with U.S. GAAP and include the accounts of the Company and its wholly owned subsidiaries. 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, 2022, DASAN Networks, Inc. (“DNI”) owned approximately 29.4% of the outstanding shares of the Company's common stock. See Note 12 Related Party Transactions 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 a net loss of \$37.4 million, \$34.7 million, and \$23.1 million for the years ended December 31, 2022, 2021, and 2020, respectively. As of December 31, 2022, the Company had an accumulated deficit of \$124.8 million and working capital of \$86.5 million. As of December 31, 2022, the Company had \$38.5 million in cash and cash equivalents, which included \$13.6 million in cash balances held by its international subsidiaries.

Based on the Company's current plans and current business conditions, the Company believes that its existing cash, cash equivalents and available credit facility 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 COVID-19 pandemic continued to adversely affect significant portions of our business and our financial condition and results of operations in 2022. The emergence of the Omicron variant in late 2021 with a resulting increase in COVID cases in 2022 resulted in re-implementation of various measures, shutdowns, including travel bans and restrictions, limitations on public and private gatherings, business and port 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 its variants, and the worldwide response related thereto, it is difficult to predict the full impact of the COVID-19 pandemic on our business.

We have experienced and continue to experience disruptions in our supply chain due to the pandemic, which has also impacted and may adversely impact our operations and the operations of some of our key suppliers. Supply chain pricing, freight and logistics costs, product and component availability, and extended lead-times became a challenge in 2021 and continue into 2022 as the world economy recovers from the COVID-19 pandemic. As we continue to incur elevated costs for components and expedite fees, our supply chain and operations teams continue to focus on managing through a constrained environment, thereby enabling DZS to maximize shipments despite elongated lead times. We remain cautious about continued supply chain headwinds that challenge the industry and anticipate a constrained supply chain environment to persist throughout 2023.

We conduct significant business in South Korea, Japan, Vietnam, India, Spain, and Canada, as well as in other countries in Europe, Asia-Pacific, Middle East and Latin America, all of which subject us to foreign currency exchange rate risk. The local currencies of our significant foreign subsidiaries are the South Korean Won ("KRW"), Japanese Yen ("JPY"), Euro ("EUR"), and Pound Sterling ("GBP"). Revenues and operating expenses are typically denominated in the local currency of each country and result from transactions by our operations in these countries. However, a significant portion of our international cost of sales is denominated in the U.S. Dollar ("USD"). During 2022, the USD appreciated significantly against the KRW, JPY, EUR and GBP which reduced the translated revenues, cost of sales and operating expenses transacted in local currencies, but not the USD based cost of sales, resulting in compressed margins and lower profitability. Late in 2022, exchange rates for these currencies returned to rates more comparable to historical rates.

As of December 31, 2022, the Company's debt obligation was \$24.1 million, net of unamortized issuance costs of \$0.3 million and of which \$1.3 million is scheduled for payment in 2023. While we believe that we are likely to achieve results of operations which would ensure loan covenant compliance, due to the potential impact of the COVID-19 pandemic, supply chain disruptions and foreign exchange fluctuations, there is a risk of non-compliance in the next 12 months and, accordingly, we have classified the entire amount as a current liability. While the borrowings under the term loan are currently classified as a current liability, the Company believes that it will maintain liquidity in the next 12 months after the balance sheet date to support its operations.

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 that are principally held with various domestic and international 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 based upon the expected collectability of accounts receivable.

For the year ended December 31, 2022, one customer represented 13% of net revenue. For the year ended December 31, 2021, two customers represented 19% and 12% of net revenue, respectively. For the year ended December 31, 2020, two customers represented 14% and 13% of net revenue, respectively.

As of December 31, 2022, no customer represented more than 10% of net accounts receivable. As of December 31, 2021, two customers represented 26% and 10% of net accounts receivable, respectively.

As of December 31, 2022, and December 31, 2021, net accounts receivable from customers in countries other than the United States represented 86% and 79%, respectively.

In 2017, the Company entered into an agreement with a customer in India to supply product for a state sponsored broadband project. The Company substantially completed its obligations under the agreement in 2018. The Company billed the customer, which is a state government sponsored entity, approximately \$59.0 million and collected payments of approximately \$41.7 million by December 31, 2020. In late March 2021, the customer's state government parent experienced difficulty passing a budget impacting the ability of the customer to make remaining agreed-upon payments to us. In light of this development, the Company recorded an allowance that covered the entire balance unpaid by the customer. Subsequent to March 2021, the Company recovered approximately \$2.4 million of accounts receivable related to the customer. As of December 31, 2022 the Company has a recorded allowance for doubtful accounts of \$13.1 million related to this receivable. The Company will continue to pursue collection of the entire outstanding balance and any amounts collected will be recognized in the period which they are received. In the event the Company's efforts to collect from this customer prove unsuccessful, DZS may seek payment through other means, including through legal action.

(e) 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.

(f) 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, software 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. Many 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 usually 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 and 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 satisfies a performance obligation but does not have an unconditional right to consideration and records accounts receivable when it satisfies a performance obligation and has an unconditional right to consideration. The Company records contract liabilities when cash payments (or unconditional rights to receive cash) are received 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 physical operation and software 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 as discussed below. 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 such costs relate directly to a contract or anticipated contracts, can be determined to generate or enhance resources that will be used in satisfying related 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.

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 years ended December 31, 2022, 2021, and 2020, such financing components were not significant.

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,		
	2022	2021	2020
Products	\$ 335,258	\$ 330,093	\$ 280,988
Services and software	40,433	20,113	19,652
Total	<u>\$ 375,691</u>	<u>\$ 350,206</u>	<u>\$ 300,640</u>

The following table present revenues by geographical region (in thousands):

	Years ended December 31,		
	2022	2021	2020
Americas	\$ 107,392	\$ 101,473	\$ 61,900
Europe, Middle East, Africa	79,286	70,046	64,580
Asia	189,013	178,687	174,160
Total	<u>\$ 375,691</u>	<u>\$ 350,206</u>	<u>\$ 300,640</u>

(g) 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 selling, marketing, general and administrative expenses. The Company performs ongoing credit evaluations of its customers and generally does not require collateral. Allowances are maintained for potential doubtful accounts based upon the expected collectability of accounts receivable using historical loss rates adjusted for customer-specific factors and current economic conditions. The Company determines historical loss rates on a rational and systematic basis. The Company performs 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. Though the allowance for doubtful accounts at each balance sheet date represents the Company's best estimate at that point in time, an increase or decrease to the allowance for doubtful accounts may be required in the future based on updated historical loss rates, customer-specific factors and economic conditions or if previously reserved balances have been collected.

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

	Years ended December 31,		
	2022	2021	2020
Balance at beginning of year	\$ 17,735	\$ 3,954	\$ 393
Charged to expense, net of recoveries	(229)	14,491	3,833
Utilization and write off	(117)	(126)	(331)
Cumulative effect of ASC 326 adoption	401	—	—
Foreign exchange impact	(1,606)	(584)	59
Balance at end of year	<u>\$ 16,184</u>	<u>\$ 17,735</u>	<u>\$ 3,954</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):

	Years ended December 31,		
	2022	2021	2020
Balance at beginning of year	\$ 873	\$ 390	\$ 343
Charged to revenue	2,556	1,132	1,303
Utilization and write off	(2,279)	(649)	(1,256)
Balance at end of year	<u>\$ 1,150</u>	<u>\$ 873</u>	<u>\$ 390</u>

(h) Inventories

Inventories are stated at the lower of cost or net realizable value, with cost being computed based on an adjusted standard basis, which approximates actual cost on an average or first-in, first-out basis. 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.

(i) 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.

(j) Comprehensive Income (Loss)

There have been no material 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, 2022, 2021, and 2020 is primarily comprised of foreign currency translation gains and losses and actuarial gains and losses from the Company's pension liabilities.

(k) 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.

(l) 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.

(m) 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. The Company performs its annual impairment testing as of October 31.

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.

(n) Business Combinations

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.

(o) Stock-Based Compensation

Stock-based compensation cost is measured at the grant date of the awards based on the estimated fair value of the awards. The Company determines the fair value of restricted stock units based on the Company's stock price on the date of grant. 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 expected term of options granted is determined based on SAB 107 simplified method. Risk-free interest rates reflect the yield on zero-coupon United States Treasury securities.

The Company amortizes the value 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.

(p) 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.

(q) Net Income (Loss) per Share

Basic net income (loss) per share is computed by dividing the net income (loss) for the period by the weighted average number of shares of common stock outstanding during the period. The calculation of diluted net income (loss) 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.

(r) Research and Development Costs

ASC 985-20 requires the capitalization of certain software development costs that are incurred subsequent to the date technological feasibility is established and prior to the date the product is generally available for sale. DZS defines technological feasibility as being attained at the time a working model is completed. There is generally no significant passage of time between achievement of technological feasibility and the availability of our software for general release, and software development costs qualifying for capitalization have been insignificant. Accordingly, DZS has not capitalized any software development costs. The Company expenses all software development costs as incurred and includes such amounts within research and development expense on the consolidated statements of comprehensive income (loss).

(s) Cloud Computing Costs

The Company capitalizes certain implementation costs related to the development stage of cloud computing arrangements. Costs related to the preliminary project stage and post-implementation phase are expensed as incurred. Cloud computing costs capitalized are included into other assets on the consolidated balance sheets. Capitalized cloud computing costs are amortized using the straight-line amortization method over the estimated term of hosting arrangements.

(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. Payments under the Company's lease arrangements are primarily fixed. The Company accounts for lease components and non-lease components as a single lease component. Variable lease payment amounts that cannot be determined at the commencement of the lease such as increases in lease payments based on changes in index rates or usage, are not included in the right-of-use assets or lease liabilities. The Company has real estate leases which require payments for common area maintenance, which are expensed as incurred as variable lease costs and hence are not included in the lease payments used to calculate lease liability. Other real estate leases contain fixed payments for common area maintenance, which are considered part of the lease payment and included in the right-of-use assets and lease 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 October 2021, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) 2021-08, Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers, which requires the Company to apply ASC 606, Revenue from Contracts with Customers, to recognize and measure contract assets and contract liabilities from contracts with customers acquired in a business combination. Before the update such balances were measured and recognized at fair value on the acquisition date. The ASU is effective for fiscal years beginning after December 15, 2022, including interim periods within those fiscal years. Early adoption is permitted, including in interim periods. The Company adopted these requirements prospectively, effective on the first day of the second quarter of year 2022. There was no material impact on our consolidated financial statements on the adoption date.

In June 2016, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“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 Company adopted the updated guidance on January 1, 2022, utilizing the modified retrospective transition method and recorded a cumulative-effect adjustment of \$0.4 million to retained earnings.

(2) Business Combinations

ASSIA Acquisition

On May 27, 2022, the Company acquired certain assets and liabilities of Adaptive Spectrum and Signal Alignment, Incorporated (“ASSIA”), an industry pioneer of broadband access quality-of-experience and service assurance software solutions (the “ASSIA Acquisition”). The core assets acquired include the CloudCheck® WiFi experience management and Express® access network optimization software solutions. These software solutions add powerful data analytics and network intelligence capabilities to DZS Cloud, including cloud-managed WiFi solutions, access network optimization and intelligent automation tools. The CloudCheck® and Express® solutions are currently deployed in over 125 million connected homes globally, and many of these connections now represent recurring software revenue opportunities for DZS.

The initial purchase consideration was \$25.0 million, including a \$2.5 million holdback that will be released in 13 months following the transaction close date. In October 2022, the Company agreed to pay an additional \$1.35 million of purchase consideration to settle certain unresolved matters related to the ASSIA Acquisition.

The acquisition was recorded as a business combination with valuation of the assets acquired and liabilities assumed recorded at their acquisition date fair value determined using level three inputs, defined as unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities. Due to the complexity of the valuation of the assets acquired and the liabilities assumed, and the timing of these activities, certain amounts included in the consolidated financial statements, including working capital, long-lived assets, intangible assets, deferred taxes and goodwill, are provisional and subject to additional adjustments within the measurement period as permitted by Topic 805. In the third and the fourth quarters of 2022, we recorded measurement-period adjustments related to purchase consideration, working capital, and intangible assets acquired. These adjustments resulted into \$9.0 million reduction of goodwill. The adjustments did not have a material impact on the amortization expense recorded in the previous quarters for intangible assets acquired.

The following summarizes the estimated fair values of the assets acquired and liabilities assumed at the date of the ASSIA Acquisition (in thousands), prepared on a provisional basis:

Provisional allocation of purchase consideration

Cash and cash equivalents	\$	203
Accounts receivable		2,322
Other assets		407
Right-of-use assets		2,172
Property, plant and equipment		232
Intangible assets		30,200
Accounts payable		(75)
Contract liabilities		(19,550)
Operating lease liabilities		(2,612)
Accrued and other liabilities		(756)
Goodwill		13,807
Total purchase consideration	\$	<u>26,350</u>

The purchase price allocation resulted in the recognition of goodwill of approximately \$13.8 million, which included the experienced workforce and the expected synergies from combining operations. The Company expects no goodwill to be deductible for tax purposes.

The following table represents the preliminary estimated fair value and useful lives of identifiable intangible assets acquired (estimated fair value in thousands):

	Estimated fair value	Estimated useful life
Intangible assets acquired		
Customer relationships	\$ 18,600	15 years
Customer backlog	5,100	10 years
Developed technology	6,200	5 - 7 years
Tradenames	300	10 years
Total intangible assets	<u>\$ 30,200</u>	

We included \$18.1 million of revenue generated by ASSIA since the acquisition date in the Company's consolidated statements of comprehensive income (loss) for the reporting period.

Optelian Acquisition

On February 5, 2021, the Company acquired Optelian Access Networks Corporation ("Optelian"), a corporation incorporated under the laws of Canada and registered extra-provincially in the Province of Ontario, pursuant to an acquisition agreement whereby the Company purchased all the outstanding shares of Optelian. Following the closing of the transaction, Optelian became the Company's wholly owned subsidiary.

Optelian was a leading optical networking solution provider. This acquisition introduced the "O-Series" to the DZS portfolio of carrier grade optical networking products with up to 400 gigabits per second (Gig) and above capability, expanding the DZS product portfolio by providing environmentally hardened, high capacity, and flexible solutions at the network edge.

The purchase price of \$7.5 million included cash paid to the shareholders and option holders of Optelian, cash paid to retire Optelian's outstanding debt on the date of acquisition, and contingent payments to shareholders.

The payment to shareholders and option holders included a \$0.3 million holdback, which was released during the third quarter of 2022, and \$1.9 million contingent consideration based on a certain percentage of future revenue of certain Optelian products through the end of 2023. We completed the purchase price allocation for Optelian acquisition in 2021. The purchase price allocation resulted in the recognition of goodwill of approximately \$1.9 million, which primarily related to the expected synergies from combining operations.

RIFT Acquisition

On March 3, 2021, the Company acquired substantially all of the assets of RIFT, Inc., a network automation solutions company, and all the outstanding shares of RIFT.IO India Private Limited, a wholly owned subsidiary of RIFT, Inc. (collectively “RIFT”). RIFT developed a carrier-grade RIFT.ware software platform that simplifies the deployment of any slice, service, or application on any cloud. This acquisition introduced DZS Xtreme, a solution within the DZS Cloud portfolio, to the overall portfolio of DZS systems and software solutions. The total purchase consideration was \$0.5 million, including a \$0.2 million holdback that was released in April of 2021 following the fulfillment of certain requirements in the purchase agreement. We completed the purchase price allocation for RIFT acquisition in 2021. The purchase price allocation resulted in the recognition of goodwill of approximately \$0.2 million, which primarily related to the expected synergies from combining operations.

(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.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

The carrying values of financial instruments such as cash and cash equivalents, restricted cash, accounts and other receivables, accounts payable and accrued liabilities approximate their fair values based on their short-term nature. The carrying value of the Company’s debt approximates its fair values based on the current rates available to the Company for debt of similar terms and maturities.

The Company classifies its contingent liability from Optelian acquisition within Level 3 as it includes inputs not observable in the market. The Company estimates the fair value of contingent consideration as the present value of the expected contingent payments, determined using the revenue forecast for certain Optelian products through the end of 2023. The fair value of contingent liability is generally sensitive to changes in the revenue forecast during the payout period. The change in the respective fair value is included in selling, marketing, general and administrative expenses on the consolidated statement of comprehensive income (loss).

The following table reconciles the beginning and ending balances of the Company’s Level 3 contingent liability (in thousands):

	Year ended December 31,	
	2022	2021
Balance at the beginning of the period	\$ 2,121	\$ —
Initial fair value of contingent liability	—	1,897
Cash payments	(558)	—
Net change in fair value	(407)	224
Balance at the end of the period	\$ 1,156	\$ 2,121

(4) Cash and Cash Equivalents and Restricted Cash

As of December 31, 2022 and 2021, the Company's cash, cash equivalents, and restricted cash consisted of financial deposits. Cash, cash equivalents and restricted cash held within the U.S. totaled \$24.9 million and \$22.3 million as of December 31, 2022 and December 31, 2021, respectively. Cash and cash equivalents held within the U.S. are held at FDIC insured depository institutions. Cash, cash equivalents and restricted cash held outside the U.S. totaled \$13.6 million and \$31.3 million as of December 31, 2022 and December 31, 2021, respectively. Restricted cash consisted primarily of cash collateral for performance bonds and warranty bonds. Long term restricted cash was \$0.1 million and \$0.2 million as of December 31, 2022 and December 31, 2021, respectively, and is included in other assets on the consolidated balance sheets.

(5) Balance Sheet Detail

Balance sheet detail as of December 31, 2022 and 2021 is as follows (in thousands):

Inventories

	As of December 31,	
	2022	2021
Raw materials	\$ 37,354	\$ 34,512
Work in process	1,050	1,427
Finished goods	40,109	20,954
Total inventories	<u>\$ 78,513</u>	<u>\$ 56,893</u>

Property, plant and equipment

	As of December 31,	
	2022	2021
Machinery and equipment	\$ 17,214	\$ 14,278
Leasehold improvements	5,683	5,219
Computers and software	4,713	3,217
Furniture and fixtures	1,748	1,771
Construction in progress and other	1,264	2,937
	<u>30,622</u>	<u>27,422</u>
Less: accumulated depreciation and amortization	(21,062)	(17,394)
Less: government grants	(82)	(186)
Total property, plant and equipment, net	<u>\$ 9,478</u>	<u>\$ 9,842</u>

Depreciation expense associated with property, plant and equipment was \$4.9 million, \$2.9 million and \$2.2 million for the years ended December 31, 2022, 2021, and 2020, respectively.

As of December 31, 2022, other assets included \$10.5 million of capitalized cloud computing implementation costs related to the Company's enterprise resource planning and reporting software as compared to \$4.2 million as of December 31, 2021.

Accrued and other liabilities

	As of December 31,	
	2022	2021
Accrued taxes payable	\$ 6,214	\$ 2,306
Accrued compensation	8,897	7,230
Accrued acquisition holdback	2,500	321
Accrued warranty	1,896	1,981
Accrued sales returns	1,150	873
Other accrued expenses	6,902	3,321
	<u>\$ 27,559</u>	<u>\$ 16,032</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:

	Years ended December 31,		
	2022	2021	2020
Balance at the beginning of the period	\$ 1,981	\$ 1,522	\$ 1,611
Charged to cost of revenue	656	798	1,072
Claims and settlements	(704)	(404)	(1,189)
Foreign exchange impact	(37)	65	28
Balance at the end of the period	<u>\$ 1,896</u>	<u>\$ 1,981</u>	<u>\$ 1,522</u>

Contract Balances

The opening and closing balances of current and long-term contract assets and contract liabilities related to contracts with customers are as follows:

	Contract assets	Contract liabilities
December 31, 2021	\$ 2,184	\$ 9,135
December 31, 2022	576	29,641
Increase (decrease)	<u>\$ (1,608)</u>	<u>\$ 20,506</u>

The decrease in contract assets during the year ended December 31, 2022 was primarily due to the invoicing of certain unbilled balances where revenue recognition criteria have been met as of December 31, 2021.

The increase in contract liabilities during 2022 was primarily due to the assumption of ASSIA contract liabilities in conjunction with the ASSIA Acquisition. Refer to Note 2 Business Combinations for further information. The amount of revenue recognized during the year ended December 31, 2022 that was included in the prior period contract liability balance was \$6.0 million. This revenue consists of services provided to customers who had been invoiced prior to the current year. We expect to recognize approximately 73% of outstanding contract liabilities as revenue over the next 12 months and the remainder thereafter.

The balance of contract cost deferred at December 31, 2022 and 2021 was \$1.0 million and \$0.8 million, respectively. During the year ended December 31, 2022, the Company recorded \$0.7 million in amortization related to contract cost deferred as of December 31, 2021.

(6) Restructuring and other charges

In 2021, the Company made the strategic decision to relocate manufacturing functions of DZS GmbH and Optelian to Seminole, Florida and to transition the above subsidiaries to sales and research and development centers. The Company incurred approximately \$13.1 million of restructuring and other charges since the beginning of its restructuring activities in the first quarter of 2021. For the year ended December 31, 2022, the Company recorded \$0.8 million of restructuring related costs, consisting primarily of logistics costs and professional services related to legal and accounting support. For the year ended December 31, 2021, the Company recorded \$12.3 million of restructuring related costs, consisting of termination-related benefits of \$8.5 million, an impairment of long-lived assets charge of \$2.7 million primarily related to right-of-use assets from operating leases, and other costs of \$1.1 million. As of December 31, 2022, the Company paid in full its liability related to termination benefits associated with DZS GmbH and Optelian restructuring.

On September 17, 2022, DZS signed an agreement with Fabrinet, a third-party provider of electro-mechanical and electronic manufacturing and distribution services, to transition the sourcing, procurement, order-fulfillment, manufacturing and return merchandise authorization activities in the Company's Seminole, Florida facility to Fabrinet. The agreement was announced on October 4, 2022. The transition to Fabrinet began in October 2022 and substantially completed in the beginning of 2023. Post transition, the DZS Seminole, Florida-based operations, supply chain and manufacturing workforce will be reduced by approximately two-thirds and the remaining team will be relocated to an appropriately sized facility. For the year ended December 31, 2022, the Company recorded \$3.4 million of restructuring related costs, consisting of accelerated depreciation of manufacturing related assets of \$1.3 million, termination-related benefits of \$0.7 million, loss on inventory sold to Fabrinet of \$0.5 million, and other costs of \$0.9 million. The Company accounted for the one-time employee termination benefits in accordance with ASC 420, Exit or Disposal Cost Obligations, and recognized the respective liability when the final terms of the benefit arrangement were communicated to the affected employees. As of December 31, 2022, the Company had \$0.7 million liability related to termination benefits associated with Seminole restructuring.

The Company also included into restructuring and other charges approximately \$0.4 million of implementation costs related to the Company's new enterprise resource planning and reporting software.

(7) Goodwill and Intangible Assets

The following table summarizes the activity related to Goodwill (in thousands):

	As of December 31,	
	2022	2021
Balance at the beginning of the period, gross	\$ 7,148	\$ 4,980
Accumulated impairment at the beginning of the period	(1,003)	(1,003)
Goodwill from acquisitions	13,807	2,168
Foreign exchange impact	—	—
Balance at the end of the period	\$ 19,952	\$ 6,145

The accumulated impairment of goodwill was \$1.0 million as of both December 31, 2022 and 2021. The Company recognized no impairment loss for goodwill for the years ended December 31, 2022, 2021, and 2020.

During the year ended December 31, 2022, the Company recorded goodwill of \$13.8 million related to the ASSIA Acquisition. Refer to Note 2 Business Combinations for further information.

Intangible assets consisted of the following (in thousands except for years):

	As of December 31, 2022			
	Gross Carrying Amount	Accumulated Amortization	Net	Weighted Average Remaining Useful Life
Customer relationships	\$ 24,330	\$ (4,759)	\$ 19,571	13.2 years
Customer backlog	5,100	(506)	4,594	9.4 years
Developed technology	11,207	(4,463)	6,744	5.0 years
In-process research and development	890	(340)	550	3.1 years
Tradenames	300	(17)	283	9.4 years
Total intangible assets, net	\$ 41,827	\$ (10,085)	\$ 31,742	10.7 years

	As of December 31, 2021			
	Gross Carrying Amount	Accumulated Amortization	Net	Weighted Average Remaining Useful Life
Developed technology	\$ 5,007	\$ (3,464)	\$ 1,543	4.1 years
Customer relationships	5,730	(2,886)	2,844	4.6 years
In-process research and development	890	(162)	728	4.1 years
Total intangible assets, net	\$ 11,627	\$ (6,512)	\$ 5,115	4.4 years

During the year ended December 31, 2022, the Company recorded \$18.6 million, \$5.1 million, \$6.2 million and \$0.3 million in customer relationships, orders backlog, developed technology, and tradenames, respectively, related to the ASSIA Acquisition. Refer to Note 2 Business Combinations for further information.

Amortization expense associated with intangible assets was \$3.6 million, \$1.6 million, and \$3.0 million for the years ended December 31, 2022, 2021, and 2020, respectively.

During 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, 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 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. The impairment charge is included in impairment of long-lived assets on the consolidated statements of comprehensive income (loss). The Company did not identify any triggering events for potential impairment of intangible assets in 2022 and 2021.

As of December 31, 2022, expected future amortization expense for the years indicated was as follows (in thousands):

2023	\$	5,283
2024		5,283
2025		5,277
2026		4,095
2027		3,143
Thereafter		8,661
Total	\$	<u>31,742</u>

(8) Debt

JPMorgan Credit Facility

On February 9, 2022, the Company entered into a Credit Agreement (the "Credit Agreement") by and between the Company, as borrower, certain subsidiaries of the Company, as guarantors, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent. The Credit Agreement originally provided for revolving loans (the "Revolving Credit Facility") in an aggregate principal amount of up to \$30.0 million, up to \$15.0 million of which is available for letters of credit, and was scheduled to mature on February 9, 2024. The maximum amount that the Company can borrow under the Credit Agreement is subject to a borrowing base, which is based on a percentage of eligible accounts receivable and eligible inventory, subject to reserves and other adjustments, plus \$10.0 million.

On May 27, 2022, the Company entered into a First Amendment to Credit Agreement (the "Amendment"), which amends the Credit Agreement dated February 9, 2022 with the Company, as borrower, certain subsidiaries of the Company, as guarantors, the lenders party thereto and JPMorgan Chase Bank, N.A., as administrative agent.

The Amendment, among other things, (1) provides for a term loan (the "Term Loan") in an aggregate principal amount of \$25.0 million with a maturity date of May 27, 2027, (2) extends the maturity date of the \$30.0 million Revolving Credit Facility to May 27, 2025, (3) permits the ASSIA Acquisition, (4) modifies the applicable margin for borrowings under the Credit Agreement to be, at the Company's option, either (i) the adjusted term SOFR rate plus a margin ranging from 3.0% to 3.5% per year or (ii) the prime rate plus a margin ranging from 2.0% to 2.5% per year, in each case depending on the Company's leverage ratio, (5) modifies the letter of credit fee such that it ranges from 3.0% to 3.5%, depending on the Company's leverage ratio, (6) modifies the commitment fee on the unused portion of the Revolving Credit Facility to range from 0.25% to 0.35% per year, depending on the Company's leverage ratio, (7) modifies the method of calculating the leverage ratio, and (8) modifies the financial covenants to (i) increase the maximum permitted leverage ratio to 3.00 to 1.00 through September 30, 2022, 2.50 to 1.00 thereafter through September 30, 2023, and 2.00 to 1.00 thereafter and (ii) replace the minimum liquidity requirement with a minimum permitted fixed charge coverage ratio of 1.25 to 1.00.

On May 27, 2022, the Company borrowed the full amount of the Term Loan to finance the ASSIA Acquisition. As of December 31, 2022, the Company's debt obligation under the Term Loan was \$24.1 million, net of unamortized issuance cost of \$0.3 million. The Company had \$4.0 million outstanding borrowings and \$0.1 million in letters of credit issued under the \$30.0 million Revolving Credit Facility as of December 31, 2022, and \$25.9 million was available to the Company for additional borrowing. The Company had no debt obligation as of December 31, 2021.

On February 15, 2023, the Company entered into a Second Amendment to Credit Agreement (the "Second Amendment"), which amends the Credit Agreement dated February 9, 2022 (as previously amended on May 27, 2022). The Second Amendment, among other things, (1) modifies the financial covenants to (i) suspend the maximum leverage ratio requirement of 2.50 to 1.00 until the fiscal quarter ending September 30, 2023 and (ii) suspend the minimum fixed charge coverage ratio requirement of 1.25 to 1.00 until the fiscal quarter ending December 31, 2023, (2) adds new financial covenants to require (i) minimum liquidity of \$30 million for the fiscal quarter ending March 31, 2023, \$35 million for the fiscal quarters ending June 30, 2023 and September 30, 2023, and \$20 million at any time until September 30, 2023, and (ii) minimum EBITDA (as defined in the Credit Facility) of (\$1 million) for the fiscal quarter ending March 31, 2023 and \$1 for the fiscal quarter ending June 30, 2023, (3) increases the applicable margin for adjusted term SOFR borrowings and prime rate borrowings to 4.0% and 3.0%, respectively, when the Company's leverage ratio exceeds 2.50 to 1.00, (4) increases the commitment fee on the unused portion of the revolving commitment to 0.40% per year when the Company's leverage ratio exceeds 2.50 to 1.00, and (5) prohibits dividends and other distributions and tightens certain covenants.

Due to the risk of non-compliance with certain financial covenants in the next 12 months, we presented our long-term debt obligation of \$22.8 million within the current portion of long-term debt on the consolidated balance sheet as of December 31, 2022.

As of December 31, 2022, the future principal maturities of the Term Loan for each of the next five years are as follows (in thousands):

2023	\$	1,250
2024		1,563
2025		1,875
2026		2,188
2027		17,499
Total	\$	<u>24,375</u>

Related Party Debt

On October 31, 2022, DNS Korea, the Company's wholly-owned subsidiary, entered into a Loan Agreement with DNI (the "November 2022 DNI Loan"). The November 2022 DNI Loan was negotiated and approved on behalf of the Company and its subsidiaries by the audit committee of the Board of Directors of the Company which consists of directors determined to be independent from DNI. The November 2022 DNI Loan consists of a term loan in the amount of KRW 7.2 billion (\$5.0 million USD), with interest payable monthly at an annual rate of 6.0% and maturing on January 31, 2023. No principal payments are due on the November 2022 DNI Loan until the maturity date, but DNS Korea may prepay the loan, or a portion thereof, without penalty. As of December 31, 2022, KRW 7.2 billion (\$5.7 million USD) was outstanding.

As security for the November 2022 DNI Loan, DNS Korea granted a security interest to DNI in inventory of KRW 28.2 billion (\$22.4 million USD) in its Janghowon warehouse, which should be maintained at a minimum of KRW 10.0 billion (\$7.9 million USD), and account receivable for 2 certain customers in the amount to KRW 20 billion (\$15.8 million USD). In the first quarter of 2023, the entire outstanding balance on this term loans was repaid and DNS Korea entered into a new short-term loan arrangement with DNI and borrowed KRW 5 billion (\$4.1 million USD).

During prior periods, certain of the Company's subsidiaries entered into term loan arrangements with DNI. In the first quarter of 2021, the entire outstanding balance of \$29.8 million on these term loans was repaid. Interest expense on related party borrowings was \$0.1 million, \$0.1 million and \$1.0 million for the years ended December 31, 2022, 2021 and 2020, respectively. As of December 31, 2021, the Company had no borrowings outstanding from related parties.

(9) Stockholders' Equity

General

The Company has authorized the issuance of 36 million shares of common stock and 25 million shares of preferred stock, with a par value of \$0.001. As of December 31, 2022, the Company had 31 million shares of common stock issued and outstanding. As of December 31, 2022, the Company had reserved 5.0 million shares of common stock for the issuance of options and restricted stock units granted under the Company's 2017 Stock Incentive Plan and Non-Qualified Inducement Stock Option Grant, and for the issuance of shares under the Company's 2018 Employee Stock Purchase Plan. The Company did not issue any shares of preferred stock as of December 31, 2022.

On November 16, 2022, we entered into an underwriting agreement to sell 2.9 million shares of Common Stock (including 0.4 million shares issued pursuant to the underwriters' option to purchase additional shares) at a price of \$11.50 per share in an underwritten public offering. The equity offering closed on November 21, 2022 and resulted in gross proceeds of approximately \$33.2 million and net proceeds, after deducting underwriting discounts and commissions and offering expenses, of approximately \$30.8 million.

On January 26, 2021, the Company sold 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 \$59.5 million.

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):

	As of December 31,		
	2022	2021	2020
Beginning accumulated other comprehensive income	\$ (4,457)	\$ (2,124)	\$ (3,939)
Actuarial loss for pension plan	4,278	1,713	(981)
Foreign currency translation adjustments, net	(4,172)	(4,046)	2,796
Ending accumulated other comprehensive income	<u>\$ (4,351)</u>	<u>\$ (4,457)</u>	<u>\$ (2,124)</u>

During the years ended December 31, 2022 and 2021, the Company recorded foreign currency translation loss, and no income taxes were allocated to the translation adjustments due to the full valuation allowance position. During the year ended December 31, 2020, the Company recorded foreign currency translation gain and allocated \$0.7 million income taxes to the translation adjustments.

Stock Incentive Plans

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

The Company's DASAN Zhong Solutions, Inc. 2017 Incentive Award Plan ("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) 1,174,359 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, 2022 was 1,099,636 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.

In 2020, the Compensation Committee of the Company's Board of Directors approved the grant to Charles Daniel Vogt, the Company's Chief Executive Officer, of nonqualified stock options to purchase 518,518 shares of the Company's common stock at an exercise price of \$10.11 per share, which equaled the closing price of the Company's common stock on August 1, 2020, the effective date of grant. The vesting commencement date is the grant date of options. The shares subject to the option shall vest on the third anniversary of the vesting commencement date, subject to Mr. Vogt's continuous service as an employee, director or consultant through such vesting date. The grant was a part of the Inducement Option Agreements with Mr. Vogt and was not covered by 2017 Plan.

In 2022, certain employees were provided a limited opportunity to exchange two stock options granted under 2017 Plan for one restricted stock unit with the vesting period equal the remaining vesting period for options as of the exchange date. As a result of the transaction, a total of 240,792 stock options were cancelled and 120,396 restricted stock units were granted in exchange. The Company accounted for the exchange as a modification of share-based payments. No incremental expense was recorded in conjunction with the modification.

Stock Options

Options issued under the Company's stock incentive plans are exercisable for periods not to exceed ten years, and vest and contain such other terms and conditions as specified in the applicable award document. Options to buy common stock are issued under the 2017 Plan, with exercise prices equal to the closing price of shares of the Company's common stock on the date of award.

The following table sets forth the summary of option activity under the stock option program for the year ended December 31, 2022 (in thousands, except weighted average data):

	Options Outstanding	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
Outstanding at the beginning of the period	2,006	\$ 12.83	8.4	\$ 8,277
Granted	5	15.95		
Exercised	(137)	10.92		
Canceled/Forfeited	(365)	17.67		
Expired	(13)	13.97		
Outstanding at the end of the period	<u>1,496</u>	11.83	7.15	3,281
Vested and exercisable at the end of the period	<u>756</u>	\$ 11.07	6.45	\$ 2,045

The aggregate intrinsic value represents the total pretax intrinsic value, based on the Company's closing stock price as of December 31, 2022 of \$12.68 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, 2022, 2021, and 2020 were \$0.5 million, \$6.2 million, and \$1.9 million, respectively.

The Company has estimated the fair value of stock options 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 SAB 107 simplified method because the Company does not have adequate historical data for newly issued stock options. 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.

The following table summarizes the weighted average assumptions used to value option grants:

	Years ended December 31,		
	2022	2021	2020
Expected term (years)	6.1	6.0	6.2
Volatility	58.9%	59.5%	60.5%
Risk free interest rate	1.5%	1.1%	0.4%
Dividend yield	0%	0%	0%
Weighted average fair value of stock options	\$ 8.83	\$ 9.84	\$ 5.40

For the years ended December 31, 2022, 2021, and 2020, the Company recorded compensation expense related to stock options of \$3.2 million, \$3.7 million and \$3.2 million, respectively. As of December 31, 2022, there was \$3.4 million of unrecognized compensation costs which are recognized over a weighted average period of 2.0 years.

Restricted Stock Units

The following table sets forth the summary of restricted stock units activity under the stock option program for the year ended December 31, 2022 (in thousands, except weighted average data):

	RSU Outstanding	Weighted Average Grant Date Fair Value
Outstanding at the beginning of the period	1,280	\$ 16.86
Granted	1,990	15.62
Cancelled/Forfeited	(197)	15.64
Vested and issued	(400)	16.53
Outstanding at the end of the period	2,673	16.08
Vested and unissued at the end of the period	50	15.28
Non-vested at the end of the period	2,623	\$ 16.09

The fair value of restricted stock units is determined based on the Company's stock price on the date of grant. Total grant-date fair value of awards granted during the years ended December 31, 2022, 2021, and 2020 was \$31.6 million, \$22.2 million and \$4.9 million, respectively. Total fair value of awards vested during the years ended December 31, 2022, 2021, and 2020 was \$7.4 million, \$3.1 million and \$0.5 million, respectively.

For the years ended December 31, 2022, 2021, and 2020, the Company recorded compensation expense related to restricted stock units of \$11.8 million, \$4.6 million and \$1.1 million, respectively. As of December 31, 2022, there was \$34.0 million of unrecognized compensation costs which are expected to be recognized over a weighted average period of 2.5 years.

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, 2022 included an expected term of 0.5 years, volatility of 54.1% and a risk free interest rate of 1.4%. For the years ended December 31, 2022, 2021, and 2020, the Company recorded \$0.8 million, \$0.7 million and \$0.3 million of expense related to the ESPP, respectively.

Stock-based Compensation

The following table summarizes total stock-based compensation expense for stock options, restricted stock units, and ESPP (in thousands).

	Years ended December 31,		
	2022	2021	2020
Cost of revenue	\$ 801	\$ 276	\$ 86
Research and product development	4,857	1,074	395
Selling, marketing, general and administrative	10,144	7,640	4,132
	<u>\$ 15,802</u>	<u>\$ 8,990</u>	<u>\$ 4,613</u>

(10) Net Income (Loss) Per Share

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

	Years ended December 31,		
	2022	2021	2020
Net income (loss)	\$ (37,431)	\$ (34,683)	\$ (23,082)
Weighted average number of shares outstanding:			
Basic	28,085	26,692	21,588
Effect of dilutive securities:			
Stock options, restricted stock units and share awards	—	—	—
Diluted	<u>28,085</u>	<u>26,692</u>	<u>21,588</u>
Net income (loss) per share:			
Basic	\$ (1.33)	\$ (1.30)	\$ (1.07)
Diluted	<u>\$ (1.33)</u>	<u>\$ (1.30)</u>	<u>\$ (1.07)</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):

	Years ended December 31,		
	2022	2021	2020
Outstanding stock options	796	914	1,505
Unvested restricted stock units	324	269	20

As of December 31, 2022, 2021 and 2020, no shares of issued common stock were subject to repurchase.

(11) Income Taxes

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

	Years ended December 31,		
	2022	2021	2020
Income (loss) before income taxes - Domestic	\$ (33,496)	\$ (6,031)	\$ (19,276)
Income (loss) before income taxes - Foreign	(1,936)	(25,439)	(305)
Income (loss) before income taxes	<u>\$ (35,432)</u>	<u>\$ (31,470)</u>	<u>\$ (19,581)</u>

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

	Years ended December 31,		
	2022	2021	2020
Current:			
Federal	\$ —	\$ —	\$ —
State	89	29	28
Foreign	1,910	1,779	3,256
Total current tax provision (benefit)	<u>\$ 1,999</u>	<u>\$ 1,808</u>	<u>\$ 3,284</u>
Deferred:			
Federal	\$ —	\$ —	\$ —
State	—	—	—
Foreign	—	1,405	217
Total deferred tax provision (benefit)	<u>\$ —</u>	<u>\$ 1,405</u>	<u>\$ 217</u>
Total tax provision (benefit)	<u>\$ 1,999</u>	<u>\$ 3,213</u>	<u>\$ 3,501</u>

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

	Years ended December 31,		
	2022	2021	2020
Expected tax provision (benefit) at statutory rate	\$ (7,441)	\$ (6,609)	\$ (4,112)
Current state taxes, net of federal benefit	70	23	22
Deferred state taxes, net of federal benefit	(1,122)	304	(325)
Foreign taxes	—	166	3,472
Foreign rate differential	(358)	(1,946)	(65)
Valuation allowance	2,976	11,341	2,550
Uncertain tax positions	953	2,696	—
Global intangible low taxed income	5,690	—	1,241
Share-based compensation	1,862	463	520
Permanent differences	117	(2,613)	189
Tax credits	(1,152)	(1,102)	(202)
Other	404	490	211
Total tax provision (benefit)	<u>\$ 1,999</u>	<u>\$ 3,213</u>	<u>\$ 3,501</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, 2022 and 2021 are as follows (in thousands):

	As of December 31,	
	2022	2021
Deferred tax assets:		
Net operating loss carryforwards	\$ 20,050	\$ 20,755
Tax credit carryforwards	4,805	5,757
Fixed assets and intangible assets	3,062	4,043
Inventory and other reserves	9,491	11,673
Operating lease liability	3,868	3,958
Capitalized research and experimental expenditures	5,674	—
Other	6,199	3,600
Gross deferred tax assets	<u>53,149</u>	<u>49,786</u>
Less valuation allowance	(49,038)	(46,027)
Deferred tax liabilities:		
Fixed assets and intangible assets	(835)	(856)
Operating lease right-of-use-asset	(2,886)	(2,903)
Other assets	(390)	—
Gross deferred tax liabilities	<u>(4,111)</u>	<u>(3,759)</u>
Total net deferred tax assets	<u>\$ —</u>	<u>\$ —</u>

For the years ended December 31, 2022 and 2021, the net changes in the valuation allowance were an increase of \$3.0 million and \$14.0 million, respectively. The increase during the current year is primarily due to capitalized research and experimental expenditures and deferred revenue assumed in conjunction with the ASSIA Acquisition. The Company maintains a valuation allowance on its global net deferred tax assets since it is more likely than not that the net deferred tax assets will not be realized in the foreseeable future.

As of December 31, 2022, the Company had net operating loss carryforwards for federal and state income tax purposes of approximately \$27.7 million and \$31.5 million, respectively. Approximately \$6.6 million of the federal losses expire in 2037, whereas approximately \$21.1 million of the losses have an indefinite life. Approximately \$28.8 million of the state losses begin to expire in various years beginning in 2023, whereas approximately \$2.7 million of the loss carryforwards have an indefinite life. As of December 31, 2022, the Company had German federal and state net operating losses of approximately \$28.9 million and \$27.9 million respectively, which do not expire and are carried forward indefinitely, and Canadian net operating losses of approximately \$5.1 million which may be carried forward for 20 years and begin to expire in 2039.

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 carryforwards which arose prior to that date that the Company can utilize in a future year. In addition, some of the pre-acquisition NOLs were written off in a prior year due to the limitation.

As of December 31, 2022, the Company had U.S. research and development tax credit carryforwards of approximately \$2.9 million and \$2.1 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, the Georgia credit carryforwards will expire beginning in 2026, and the Texas credit carryforwards will expire beginning in 2040. In addition, the Company has Canadian research and investment credits of approximately \$2.8 million and \$1.8 million, respectively. The Canadian research and investment credits begin to expire in 2031.

The Company does not intend to distribute the earnings from its foreign subsidiaries and has not recorded any deferred tax liability related to such amounts. The Company considers any 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. After reviewing the documentation maintained in support of uncertain tax positions taken in prior years, the Company concluded that it will be unlikely to sustain those positions should they be audited by the relevant tax authorities. Accordingly, the Company increased the reserve for those positions by approximately \$2.3 million in 2021. As of December 31, 2022, the Company had gross unrecognized tax benefits of \$5.1 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 2022, 2021, and 2020 are as follows (in thousands):

	As of December 31,		
	2022	2021	2020
Balance at beginning of year	\$ 4,188	\$ 1,255	\$ 1,036
Increases (decreases) related to prior year's tax positions	(31)	2,252	—
Increases related to current year tax positions	983	681	219
Balance at end of year	<u>\$ 5,140</u>	<u>\$ 4,188</u>	<u>\$ 1,255</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 penalties during the years ended December 31, 2022, 2021 and 2020.

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	2019 - 2022
California	2018 - 2022
Canada	2018 - 2022
Brazil	2018 - 2022
Germany	2017 - 2022
Japan	2017 - 2022
Korea	2017 - 2022
United Kingdom	2018 - 2022
Vietnam	2012 - 2022

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.

(12) Related Party Transactions

Related Party Debt

As of December 31, 2022, the Company had KRW 7.2 billion (\$5.7 million USD) outstanding of the related party borrowing from DNI. See Note 8 Debt for additional information about the Company's related party debt.

The following table sets forth payment guarantees of certain of the Company's performance obligations as of December 31, 2022 that have been provided by DNI. DNI owns approximately 29.4% of the outstanding shares of the Company's 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
Dasan Networks, Inc.	\$ 3,223	Payment guarantee to Industrial Bank of Korea
Dasan Networks, Inc.	1,390	Payment guarantee to Shinhan Bank
	<u>\$ 4,613</u>	

Other Related Party Transactions

Sales, cost of revenue, research and product development, selling, marketing, general and administrative, interest expense and other expenses to and from related parties were as follows (in thousands) for the years ended December 31, 2022, 2021, and 2020:

Counterparty	For the year ended December 31, 2022					
	Sales	Cost of revenue	Research and product development	Selling, marketing, general and administrative	Interest expense	Other expenses
Dasan Networks, Inc.	\$ 1,748	\$ 969	\$ 91	\$ 1,234	\$ 55	\$ 64
DS Commerce, Inc.	—	26	3	29	—	—
	<u>\$ 1,748</u>	<u>\$ 995</u>	<u>\$ 94</u>	<u>\$ 1,263</u>	<u>\$ 55</u>	<u>\$ 64</u>

Counterparty	For the year ended December 31, 2021					
	Sales	Cost of revenue	Research and product development	Selling, marketing, general and administrative	Interest expense	Other expenses
Dasan Networks, Inc.	\$ 2,103	\$ 1,940	\$ 1,019	\$ 1,620	\$ 132	\$ 197
Dasan Invest Co., Ltd.	—	30	134	57	—	—
	<u>\$ 2,103</u>	<u>\$ 1,970</u>	<u>\$ 1,153</u>	<u>\$ 1,677</u>	<u>\$ 132</u>	<u>\$ 197</u>

Counterparty	For the year ended December 31, 2020					
	Sales	Cost of revenue	Research and product development	Selling, marketing, general and administrative	Interest expense	Other expenses
Dasan Networks, Inc.	\$ 4,362	\$ 3,843	\$ 953	\$ 1,579	\$ 1,047	\$ 355
Dasan Invest Co., Ltd.	—	22	100	42	—	—
	<u>\$ 4,362</u>	<u>\$ 3,865</u>	<u>\$ 1,053</u>	<u>\$ 1,621</u>	<u>\$ 1,047</u>	<u>\$ 355</u>

The Company has entered into sales agreements with DNI to sell certain services and finished goods produced by the Company. The Company also has an agreement with DNI in which DNI acts as a sales channel to third party customers. The above transactions are included in sales and cost of revenue on the consolidated statements of comprehensive income (loss). Sales to DNI are recorded net of royalty fees for a sales channel arrangement.

DNS Korea, a subsidiary of the Company, has a lease agreement with DNI related to the lease of a warehouse facility. DNS Korea also had a separate office lease agreement with DNI. In the first quarter of 2022, DNI sold the office building to the unrelated third party, and the respective lease was reassigned to the new landlord. Operating lease cost related to DNI leases totaled \$0.5 million, \$1.8 million, and \$1.7 million for the years ended December 31, 2022, 2021, and 2020, respectively. Operating lease expense is allocated between cost of revenue, research and product development, and selling, marketing, general and administrative expenses on the consolidated statements of comprehensive income (loss). As of December 31, 2022, the right-of-use asset and operating lease liability related to DNI leases were \$1.7 million. As of December 31, 2021, the right-of-use asset and operating lease liability related to DNI leases were \$6.4 million. Deposits for the DNI office lease were included in other assets on the consolidated balance sheet as of December 31, 2021.

The Company also pays a license fee under the Trademark License Agreement with DNI. The license fee is calculated as 0.4% of DNS Korea annual sales. For the years ended December 31, 2022, 2021, and 2020, license related expense were \$0.7 million, \$0.7 million, and \$0.6 million, respectively, and were included into selling, marketing, general and administrative expenses on the consolidated statements of comprehensive income (loss).

The Company had an agreement with Dasan Invest Co., Ltd. to provide IT services for the Company. The agreement was terminated in the fourth quarter of 2021 and the new agreement was signed with DS Commerce, Inc. Both entities have an affiliation with DZS board members. The respective expense was allocated between cost of revenue, research and product development, and selling, marketing, general and administrative expenses on the consolidated statements of comprehensive income (loss). Interest expense represents interest paid to DNI for the related party debt. Refer to Note 8 Debt for further information.

Other expenses to related parties represent expenses to DNI for its payment guarantees relating to the Company's performance obligations. The Company pays DNI a guarantee fee which is calculated as 0.9% of the guaranteed amount. Refer to the table above for further information 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, 2022 and 2021 were as follows (in thousands):

Counterparty	As of December 31, 2022					
	Account receivables	Other receivables	Other assets	Loans Payable	Accounts payable	Accrued and other liabilities
Dasan Networks, Inc.	\$ 943	\$ 123	\$ —	\$ 5,706	\$ 1,019	\$ 483
DS Commerce, Inc.	—	—	—	—	16	—
	<u>\$ 943</u>	<u>\$ 123</u>	<u>\$ —</u>	<u>\$ 5,706</u>	<u>\$ 1,035</u>	<u>\$ 483</u>

Counterparty	As of December 31, 2021					
	Account receivables	Other receivables	Other assets	Loans Payable	Accounts payable	Accrued and other liabilities
Dasan Networks, Inc.	\$ 181	\$ 215	\$ 691	\$ —	\$ 785	\$ —
DS Commerce, Inc.	—	—	—	—	—	—
	<u>\$ 181</u>	<u>\$ 215</u>	<u>\$ 691</u>	<u>\$ —</u>	<u>\$ 785</u>	<u>\$ —</u>

The related party receivable and payable balances are reflected in the respective balance sheet captions on the consolidated balance sheets as of December 31, 2022 and 2021.

(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 2028.

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.

The components of lease expense were as follows for the years ended December 31, 2022, 2021 and 2020 (in thousands):

	Years ended December 31,		
	2022	2021	2020
Operating lease cost	\$ 4,152	\$ 4,201	\$ 5,393
Short-term lease cost	152	1,302	264
Total net lease cost	\$ 4,304	\$ 5,503	\$ 5,657

Short-term lease costs related to the short-term rent of office spaces and office equipment leases. Variable lease cost was not significant for the years ended December 31, 2022, 2021, and 2020.

During the year ended December 31, 2022, the Company recorded \$0.8 million of impairment charges on the right-of-use assets related to the office lease in Redwood City, California, acquired in conjunction with ASSIA Acquisition. Following the acquisition, the Company made a decision to vacate the space in Redwood City and to adopt a remote work policy in the region.

During the year ended December 31, 2021, the Company recorded \$4.2 million of impairment charges on the right-of-use assets, including \$2.5 million related to the restructuring in Hanover, Germany and \$1.7 million related to the headquarters relocation to Plano, Texas. These charges were included into restructuring and other charges and impairment of long-lived assets, respectively, on the consolidated statements of comprehensive income (loss).

Supplemental cash flow information related to the Company's operating leases was as follows for the years ended December 31, 2022, 2021, and 2020 (in thousands):

	Years ended December 31,		
	2022	2021	2020
Operating cash outflows from operating leases	\$ 5,184	\$ 5,936	\$ 5,307
Right-of-use assets obtained in exchange for operating lease obligations	5,010	2,783	1,405

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, 2022 and 2021 (dollars in thousands):

	As of December 31,	
	2022	2021
Assets:		
Right-of-use assets from operating leases	\$ 12,606	\$ 12,640
Liabilities:		
Operating lease liabilities - current	\$ 4,834	\$ 4,097
Operating lease liabilities - non-current	11,417	12,103
Total operating lease liabilities	\$ 16,251	\$ 16,200
Weighted average remaining lease term	3.7 years	4.2 years
Weighted average discount rate	5.3%	5.6%

The following table presents the maturity of the Company's operating lease liabilities as of December 31, 2022 (in thousands):

2023	\$ 5,129
2024	4,965
2025	3,491
2026	2,131
2027	1,018
Thereafter	685
Total operating lease payments	17,419
Less: imputed interest	(1,168)
Total operating lease liabilities	\$ 16,251

(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 performance guarantees, such as standby letter of credits or surety bonds. These instruments are arrangements under which the financial institution or surety provides a financial guarantee that the Company will perform in accordance with contractual or legal obligations. As of December 31, 2022, the Company had \$11.8 million of performance guarantees in the form of bank guarantees or surety bonds guaranteed by third parties.

Purchase Commitments

As of December 31, 2022, we had \$112.6 million in outstanding purchase order commitments to our contract manufacturers and component suppliers for inventory. In certain instances, we are permitted to cancel, reschedule or adjust these orders. Consequently, only a portion of this amount relates to firm, non-cancelable and unconditional obligations.

Trade Compliance Matter

During the first quarter of 2022, the Company received a notice letter from the Office of the Commissioner of Customs of the India Department of Revenue (the "Notice") claiming the Company had mis-declared and wrongly classified certain products imported to India by the Company at the time of clearance of customs. The Notice claims that due to such mis-declaration and wrong classification of the imported products, the Company and its contract manufacturer in India underpaid duties approximating \$3.9 million related to such products. The Company intends to vigorously defend itself in this matter. As we have not yet received the full contents of the Notice, we are unable to estimate a potential loss related to this matter, if any, which could range up to the full amount of the unpaid duties, plus penalties and interest.

In addition to the Notice discussed above, 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

Defined Contribution Plans

The Company maintains a 401(k) plan for its employees in the United States 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 made discretionary contributions to the plan in 2022 and 2021. The Company made no discretionary contributions to the plan in 2020. For the years ended December 31, 2022 and 2021, the Company recorded an expense of \$0.9 million and \$0.5 million, respectively, compared to no expense for the year ended December 31, 2020.

The Company maintains a defined contribution plan for its employees in South Korea. Under the defined contribution plan, the Company contributes the equivalent of 8.3% of an employee's gross salary into the plan. For the year ended December 31, 2022, the Company recorded an expense of \$1.2 million for the plan, compared to \$1.3 million recorded for each of the years ended December 31, 2021 and 2020.

Defined Benefit Plans

The Company sponsors defined benefit plans for its employees in Germany and Japan. Defined benefit plans provide pension benefits based on compensation and years of service. The Germany plans were frozen as of September 30, 2003 and have not been offered to new employees after that date.

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

	Years ended December 31,		
	2022	2021	2020
Benefit obligation at beginning of year	\$ 16,527	\$ 20,052	\$ 17,671
Service cost	100	115	95
Interest cost	146	82	191
Benefits paid	(572)	(592)	(568)
Actuarial (gain) loss	(4,278)	(1,606)	1,002
Foreign currency exchange rate change	(902)	(1,524)	1,661
Benefit obligation at end of year	11,021	16,527	20,052
Underfunded status at end of year	\$ 11,021	\$ 16,527	\$ 20,052

The Company has recorded the 2022 and 2021 underfunded status as a long-term liability on the consolidated balance sheets. The Company holds pension insurance contracts, with the Company as beneficiary, in the amount of \$2.5 million and \$2.9 million as of December 31, 2022 and 2021, respectively, related to individuals under the pension plans. 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 consolidated balance sheet. 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 net periodic benefit cost related to the plans consisted of the following components (in thousands):

	Years ended December 31,		
	2022	2021	2020
Service Cost	\$ 100	\$ 115	\$ 95
Interest Cost	146	82	170
Net amortization of net gain (loss)	—	107	21
Net periodic benefit cost	\$ 246	\$ 304	\$ 286

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 table presents changes in benefit obligations recognized net of tax in other comprehensive income (in thousands):

	Years ended December 31,		
	2022	2021	2020
Amortization of net (gain) loss	\$ —	\$ (107)	\$ (21)
Actuarial (gain) loss in the current period	(4,278)	(1,606)	1,002
Net change during the period	\$ (4,278)	\$ (1,713)	\$ 981

The increase in the actuarial gain during the year ended December 31, 2022, compared to the year ended December 31, 2021 was mainly due to the increase in the discount rate, resulting from an increase in the implicit rate of high-quality fixed income investments. 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 2022.

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

	Years ended December 31,		
	2022	2021	2020
Discount rate	3.7%	1.0%	0.4%
Rate of compensation increase	2.0%	1.7%	1.7%

The following benefit payments, which are funded by the Company, are expected to be paid (in thousands):

2023	\$	707
2024		704
2025		730
2026		720
2027		743
2028 - 2031	\$	3,212

(16) Enterprise-Wide Information

The Company is a global provider of access and optical networking infrastructure and cloud software solutions deployed by advanced Tier 1, national and regional service providers and enterprise customers. There are no segment managers who are held accountable for operations, operating results and plans for levels or components below the Company unit level. Accordingly, the Company is considered to be in a single operating segment. The Company's chief operating decision maker is the Company's Chief Executive Officer, who reviews financial information presented on a consolidated basis accompanied with disaggregated 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(f) Revenue Recognition for the required disclosures on geographical concentrations and revenues by source.

The Company's property, plant and equipment, net of accumulated depreciation, were located in the following geographical areas (in thousands) as of December 31, 2022 and 2021:

	As of December 31,	
	2022	2021
United States	\$ 5,725	\$ 6,105
Korea	2,706	2,367
Japan	644	799
Canada	157	280
Germany	110	210
Other	136	81
	<u>\$ 9,478</u>	<u>\$ 9,842</u>

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, 2022, the end of the period covered by this Annual Report on Form 10-K. Our management, including our Chief Executive Officer and our Chief Financial Officer, supervised and participated in the evaluation. They concluded that our disclosure controls and procedures were not effective as of December 31, 2022 due to a material weakness in internal control over financial reporting described below in Management’s Report on Internal Control Over Financial Reporting.

Management’s Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2022, 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.

A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the Company’s annual or interim consolidated and combined financial statements will not be prevented or detected on a timely basis.

In the fourth quarter of 2022, the Company entered a significant sales agreement with an existing customer which was subject to unique delivery terms. In reviewing the accounting for the revenue transaction, our management identified a deficiency in the effectiveness of a control intended to properly document and review relevant facts in connection with revenue recognition related to such transaction. Accordingly, a material error was detected in recorded revenue in our 2022 preliminary consolidated financial statements as a result of this misapplication of U.S. GAAP. The December 31, 2022 consolidated financial statements included in this Annual Report on Form 10-K and in our earnings press release filed on February 16, 2023 with our Current Report on Form 8-K have been corrected prior to issuance.

As a result of the above material weakness, management has concluded that, as of December 31, 2022, our internal control over financial reporting was not effective.

The effectiveness of our internal control over financial reporting as of December 31, 2022 has been audited by Ernst & Young LLP, an independent registered public accounting firm, and Ernst & Young LLP has issued a report on our internal control over financial reporting, which is included herein.

Remediation Plan

Management has begun implementing a remediation plan to reassess the design of our controls and modify our processes related to the accounting for significant revenue transactions as well as enhancing monitoring and oversight controls in the application of accounting guidance related to such transactions. The remediation plan includes the following:

- Training with operational personnel to ensure potential unique revenue transactions are identified and communicated to accounting personnel in advance so the accounting for such transactions can be evaluated and business terms addressed as necessary;
- Implementing specific review procedures designed to enhance our revenue recognition controls;
- Strengthening our revenue recognition control with improved documentation standards, technical oversight and training.

We currently plan to have our enhanced review procedures and documentation standards in place and operating in the first half of fiscal 2023.

Changes in Internal Control over Financial Reporting

There have not been any changes in our internal control over financial reporting during the most recent fiscal quarter 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.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of DZS Inc.

Opinion on Internal Control Over Financial Reporting

We have audited DZS Inc. and subsidiaries' internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, because of the effect of the material weakness described below on the achievement of the objectives of the control criteria, DZS Inc. and subsidiaries (the Company) has not maintained effective internal control over financial reporting as of December 31, 2022, based on the COSO criteria.

A material weakness is a deficiency, or combination of deficiencies, in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the company's annual or interim financial statements will not be prevented or detected on a timely basis. The following material weakness has been identified and included in management's assessment: a material weakness in the operating effectiveness of its internal control related to evaluation of a significant sales agreement with unique delivery terms.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2022 and 2021, the related consolidated statements of comprehensive income (loss), stockholders' equity, and cash flows for each of the two years in the period ended December 31, 2022, and the related notes. This material weakness was considered in determining the nature, timing and extent of audit tests applied in our audit of the 2022 consolidated financial statements, and this report does not affect our report dated March 10, 2023, which expressed an unqualified opinion thereon.

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/ Ernst & Young LLP

Dallas, Texas

March 10, 2023

ITEM 9B. OTHER INFORMATION

None.

ITEM 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS.

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 2023 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 ACCOUNTANT 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 AND FINANCIAL STATEMENT SCHEDULES

1. Financial Statements

The Index to Consolidated Financial Statements on page 36 is incorporated herein by reference as the list of financial statements required as part of this Annual Report on Form 10-K.

2. Exhibits

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

ITEM 16. FORM 10-K SUMMARY

None.

INDEX TO EXHIBITS

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
3.1	Restated Certificate of Incorporation of DASAN Zhone Solutions, Inc., as amended through February 28, 2017	10-K	3.1	September 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 DZS Inc.	10-K	3.2	March 11, 2021	
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	
10.6.1#	First Amendment to Employment Agreement dated as of June 1, 2021 by and between DZS Inc. and Charlie Vogt	8-K	10.1	June 4, 2021	
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 August 2, 2021, by and between DZS Inc. and Misty D. Kawecki	8-K	10.1	August 2, 2021	

Exhibit Number	Exhibit Description	Incorporated by Reference			Filed or Furnished Herewith
		Form	Exhibit	Filing Date	
10.10#	Employment Agreement dated as of September 28, 2020 by and between DZS Inc. and Justin K. Ferguson	10-K	10.10	March 11, 2021	
10.11	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	
10.12	Credit Agreement, dated as of February 9, 2022, among DZS Inc., as Borrower, the other Loan Parties party thereto, the Lenders from time to time parties thereto and JPMorgan Chase Bank, N.A., as Administrative Agent.	8-K	10.1	February 10, 2022	
10.13	First Amendment to Credit Agreement, dated as of May 27, 2022, among DZS Inc., as Borrower, the other Loan Parties party thereto, the Lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent.	8-K	10.1	June 1, 2022	
10.14	Second Amendment to Credit Agreement, dated as of February 15, 2023, among DZS Inc., as Borrower, the other Loan Parties party thereto, the Lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent.	8-K	10.1	February 16, 2023	
21.2	List of Subsidiaries				X
23.1	Consent of Independent Registered Public Accounting Firm				X
23.2	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	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because XBRL tags are embedded within the Inline XBRL document				X
101.SCH	Inline XBRL Taxonomy Extension Schema				X
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase				X
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase				X
101.LAB	Inline XBRL Taxonomy Extension Labels Linkbase				X
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase				X
104	Cover Page Interactive Data File (embedded within the Inline XBRL document and included in Exhibit 101)				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 10, 2023

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 10, 2023
<u>/s/ Misty Kawecki</u> Misty Kawecki	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 10, 2023
<u>/s/ Min Woo Nam</u> Min Woo Nam	Chairman of the Board of Directors	March 10, 2023
<u>/s/ Matt Bross</u> Matt Bross	Director	March 10, 2023
<u>/s/ Barbara Carbone</u> Barbara Carbone	Director	March 10, 2023
<u>/s/ Joon Kyung Kim</u> Joon Kyung Kim	Director	March 10, 2023
<u>/s/ David Schopp</u> David Schopp	Director	March 10, 2023
<u>/s/ Choon Yul Yoo</u> Choon Yul Yoo	Director	March 10, 2023

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

The following summary of the material terms of the common stock of DZS Inc. (the "Company") summarizes the material terms of, is subject to and qualified in its entirety by reference to the terms and provisions of our restated certificate of incorporation, as amended (the "Charter"), and our amended and restated bylaws (the "Bylaws"). For the complete terms of our common stock, please refer to the Charter and the Bylaws, each as may be amended from time to time. Our common stock is the only class of securities of the Company that is registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended.

General

We have authorized 61,000,000 shares of capital stock, of which 36,000,000 are shares of common stock, par value \$0.001 per share, and 25,000,000 are shares of preferred stock, par value \$0.001 per share. As of March 1, 2023, there were 31,048,773 shares of common stock issued and outstanding and no shares of preferred stock issued and outstanding. The rights, preferences and privileges of holders of common stock are subject to the rights of the holders of any series of preferred stock that we may designate and issue in the future. Our common stock is listed on the NASDAQ Capital Market under the symbol "DZSI".

Board of Directors

The Board of Directors is divided into three classes of directors that are as nearly equal as possible, with no class having less than one director. Directors are elected for three-year terms with a different classes' term expiring at each annual meeting. Directors continue to hold office until their respective successors are elected and qualified.

Dividends

We have never paid or declared any cash dividends on our common stock 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.

In the event the Board of Directors does issue a dividend, subject to the rights of the holders of any preferred stock, holders of our common stock are entitled to receive equally, on a per share basis, such dividends and other distributions in cash, securities or other property of the Company as may be declared by the Board of Directors.

Voting Rights

Except as otherwise required by law or by the Charter, each holder of common stock is entitled to cast one vote for each share of common stock standing in such holder's name on the stock transfer records of the Company. A quorum of stockholders is necessary to hold a valid meeting of stockholders. The presence, in person or by proxy, of the holders of a majority of the issued and outstanding common stock entitled to vote at such meeting, is necessary to constitute a quorum at such meeting. Directors are elected by a plurality of votes.

For all other matters presented to stockholders, unless otherwise required by applicable law, the Bylaws or the Charter, a majority of the voting power of the issued and outstanding stock of the Company entitled to vote thereon, present and voting, in person or represented by proxy, shall decide the matter. Certain amendments to the Charter require 66-2/3% approval of the voting power of the Company that would be entitled to vote in the election of directors (i.e., Articles V (Board of Directors), VI (Limitation of Liability), VII (Indemnification), VIII (Stockholder Action) and IX (Amendment)). The Bylaws may be amended by a majority vote of the Board of Directors or by 66-2/3% of the voting power of all shares of the Company entitled to vote generally in the election of directors, voting as a single class.

No Preemptive or Similar Rights

Our common stock is not entitled to preemptive rights and is not subject to conversion, redemption or sinking fund provisions. The rights, preferences and privileges of the holders of our common stock are subject to, and may be adversely affected by, the rights of the holders of any series of our preferred stock that we may designate and issue in the future.

Liquidation and Distribution

Upon the liquidation, dissolution or winding up of the Company, the holders of common stock are entitled to ratably receive our net assets remaining for distribution after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock.

Preferred Stock

The Board of Directors is authorized to, subject to any limitations imposed by applicable law, provide for issuances of preferred stock. The Board of Directors is further authorized to fix the voting powers, designations, powers, preferences and other rights of each series of preferred stock. The number of authorized shares of preferred stock may only be increased or decreased by the affirmative vote of the holders of a majority in voting power of the Company entitled to vote, without the separate vote of the holders of preferred stock as a class.

Transfer Agent and Registrar

Our transfer agent and registrar for our capital stock is Computershare Trust Company, N.A. The transfer agent's address is P.O. Box 505000, Louisville, KY 40233, and its telephone number is (800) 942-5909.

ANTI-TAKEOVER PROVISIONS OF THE CHARTER AND THE BYLAWS

General

The Charter and the Bylaws contain certain provisions that could have an effect of delaying, deferring or preventing a change in control of the Company in the event of a merger, reorganization, sale or transfer of substantially all of the Company's assets, or some other extraordinary corporate transaction involving the Company. Set forth below is a description of such provisions. The description is intended as a summary only and is qualified in its entirety by reference to the Delaware General Corporation Law (the "DGCL"), the Charter and the Bylaws.

Advance Notice Requirements for Stockholder Proposals and Director Nominations

The Bylaws establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of stockholders, including proposed nominations of persons for election to the Board of Directors. Stockholders at an annual meeting may only consider proposals or nominations specified in the notice of meeting or brought before the meeting, by or at the direction of the Board of Directors or by a stockholder of record on the date of a stockholder's notice and on the record date for the determination of stockholders entitled to vote on the annual meeting, who is entitled to vote at the meeting and who has delivered timely written notice in proper form to the Secretary of the Company.

Choice of Forum

The Charter provides that the Court of Chancery of the State of Delaware is the sole and exclusive forum for (i) any derivative action or proceeding brought on behalf of the Company, (ii) any action asserting a claim of breach of a fiduciary duty owed by any director, officer, employee or agent of the Company to the Company or the Company's stockholders, (iii) any action asserting a claim against the Company arising pursuant to any provision of the DGCL, the Charter or the Bylaws, or (iv) any action asserting a claim against the Company governed by the internal affairs doctrine, in each such case subject to the Court of Chancery having personal jurisdiction over the indispensable parties named as defendants therein.

Delaware Anti-takeover Law

The Company is subject to Section 203 of the DGCL ("Section 203"), an anti-takeover law. In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a business combination with an interested stockholder for a period of three years following the date such person became an interested stockholder, unless the business combination or the transaction in which such person became an interested stockholder is approved in a prescribed manner. Generally, a "business combination" includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. Generally, an "interested stockholder" is a person that, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation's voting stock.

DZS Inc.¹

List of Subsidiaries

DZS Inc. had the following subsidiaries at December 31, 2022:

	<u>Organized under the laws of</u>
DZS California Inc. ²	California
DASAN Network Solutions, Inc.	Korea
DASAN India Private Limited	India
DZS Vietnam Company Limited ³	Vietnam
D-Mobile Limited	Taiwan
DZS Japan Inc.	Japan
DZS Solutions India Private Limited	India
DZS Canada Inc. ⁴	Canada
Optelian Mexico, S. de R.L. de C.V.	Mexico
Optelian Servicios Mexico, S. de R.L. de C.V.	Mexico
DZS GmbH ⁵	Germany
DZS Ltd. ⁶	United Kingdom
Keymile Ltda.	Brazil
Paradyne Corporation	Delaware
Paradyne Finance Corp.	Delaware
DZS Sweden AB ⁷	Sweden
DZS International Ltd. ⁸	Cayman Islands
Zhone Technologies B.V.	Netherlands
Zhone Technologies Campus, LLC	California
DZS Colombia Limitada ⁹	Colombia
Dasan Zhone Solutions do Brasil ¹⁰	Brazil
Zhone Technologies GmbH	Germany
DZS International Inc. ¹¹	Delaware
Zhone Technologies Limited	Hong Kong
Zhone Technologies Ltd.	United Kingdom
Zhone Technologies Pte. Ltd.	Singapore
DZS Mexico S. de R.L. de C.V. ¹²	Mexico
DZS Italy S.R.L. ¹³	Italy
DZS Services Inc. ¹⁴	Delaware
Zhone Technologies, SA (PTY) LTD	South Africa

¹ Formerly known as DASAN Zhone Solutions, Inc., name change effective as of August 26, 2020.

² Formerly known as DASAN Network Solutions, Inc., name change effective as of December 10, 2021.

³ Formerly known as DASAN Vietnam Company Limited, name change effective as of June 22, 2022.

⁴ Formerly known as Optelian Access Networks Corp., name change effective as of November 24, 2021.

⁵ Formerly known as Keymile GmbH, name change effective as of November 23, 2020.

⁶ Formerly known as Keymile Ltd., formerly known as DZSI Ltd., name change effective October 6, 2020.

⁷ Formerly known as Zhone AB, name change effective as of November 25, 2021.

⁸ Formerly known as Zhone International Ltd., name change effective as of January 14, 2022.

⁹ Formerly known as Zhone Technologies de Colombia Limitada, name change effective as of November 15, 2022.

¹⁰ Formerly known as Zhone Technologies do Brasil LTDA, name change effective as of August 13, 2018.

¹¹ Formerly known as Zhone Technologies International, Inc., name change effective as of October 23, 2020.

¹² Formerly known as Zhone Technologies S. de R.L. de C.V., name change effective as of May 26, 2022.

¹³ Formerly known as Zhone Technologies S.R.L., name change effective as of March 8, 2022.

¹⁴ Formerly known as ZTI Merger Subsidiary III, Inc., name change effective as of October 23, 2020.

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

- (1) Registration Statement (Form S-3 No. 333-262634) of DZS Inc.,
- (2) Registration Statements (Form S-8 No. 333-263395, 333-254218, 333-246295, 333-230236, 333-228276, 333-221568, 333- 202580, 333-194334, 333-180148, 333-172876, 333-165510, 333-158009, 333-155321, 333-149598, 333- 141153, 333-132336, 333-123369) pertaining to the 2017 Incentive Plan of DZS Inc., 2001 Stock Incentive Plan of DZS Inc. and 2018 Employee Stock Purchase Plan of DZS Inc.

of our reports dated March 10, 2023, with respect to the consolidated financial statements of DZS Inc. and subsidiaries and the effectiveness of internal control over financial reporting of DZS Inc. included in this Annual Report (Form 10-K) of DZS Inc. for the year ended December 31, 2022.

/s/ Ernst & Young LLP

Dallas, Texas
March 10, 2023

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We have issued our report dated March 11, 2021, with respect to the consolidated financial statements included in the Annual Report of DZS Inc. on Form 10-K for the year ended December 31, 2022. We consent to the incorporation by reference of said report in the Registration Statements of DZS Inc. on Forms S-8 (File Nos. 333-263395, 333-254218, 333-246295, 333-230236, 333-228276, 333-221568, 333-202580, 333-194334, 333-180148, 333-172876, 333-165510, 333-158009, 333-155321, 333-149598, 333-141153, 333-132336, and 333-123369) and on Forms S-3 (File No. 333-262634).

/s/ GRANT THORNTON LLP

Dallas, Texas
March 10, 2023

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

I, Charles Daniel Vogt, certify that:

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

Date: March 10, 2023

/s/ Charles Daniel Vogt

Charles Daniel Vogt

President, Chief Executive Officer

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

I, Misty Kawecki, certify that:

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

Date: March 10, 2023

/s/ Misty Kawecki

Misty Kawecki
Chief Financial Officer
(Principal Financial and Accounting Officer)

SECTION 1350 CERTIFICATIONS

Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, Charles Daniel Vogt, President and Chief Executive Officer of DZS Inc. (the "Company"), and Misty Kawecki, Chief Financial Officer (Principal Financial and Accounting Officer) of the Company, each hereby certify that, to their knowledge:

1. The Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2022 (the "Report") fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 10, 2023

/s/ Charles Daniel Vogt

Charles Daniel Vogt
President, Chief Executive Officer

/s/ Misty Kawecki

Misty Kawecki
Chief Financial Officer
(Principal Financial and Accounting Officer)



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