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 001-38324

Casa Systems, Inc.
(Exact name of Registrant as specified in its Charter)

Delaware **(State or other jurisdiction of incorporation or organization)**	**75-3108867** **(I.R.S. Employer Identification No.)**
100 Old River Road **Andover, Massachusetts** **(Address of principal executive offices)**	**01810** **(Zip Code)**

Registrant's telephone number, including area code: (978) 688-6706

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

Title of each class	Trading Symbol	Name of each exchange on which registered
Common Stock, $0.001 par value per share	CASA	The Nasdaq Stock Market LLC

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

None
(Title of class)

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. YES ☐ NO ☒

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or 15(d) of the 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	☐	Accelerated filer	☒
Non-accelerated filer	☐	Smaller reporting company	☒
		Emerging growth company	☐

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 ☒

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the Registrant, based on the closing price of the shares of Common Stock on The Nasdaq Global Select Market on June 30, 2022 was approximately $159.5 million.

The number of shares of Registrant's Common Stock outstanding as of March 7, 2023 was 95,851,524.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Registrant's definitive proxy statement relating to its 2023 Annual Stockholders' Meeting expected to be filed pursuant to Regulation 14A within 120 days after the Registrant's fiscal year end of December 31, 2022 are incorporated by reference into Part III of this Annual Report on Form 10-K.

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Cautionary Note Regarding Forward-Looking Statements

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. All statements other than statements of historical fact contained in this Annual Report on Form 10-K, including statements regarding our future results of operations and financial position, business strategy and plans and objectives of management for future operations, are forward-looking statements. These statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements.

In some cases, you can identify forward-looking statements by terms such as “may,” “might,” “should,” “expects,” “plans,” “anticipates,” “would,” “could,” “intends,” “target,” “projects,” “contemplates,” “believes,” “estimates,” “predicts,” “potential” or “continue” or the negative of these terms or other similar expressions. The forward-looking statements in this Annual Report on Form 10-K are only predictions. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our business, financial condition and results of operations. These forward-looking statements speak only as of the date of this Annual Report on Form 10-K and are subject to a number of risks, uncertainties and assumptions described in the “Risk Factors” section and elsewhere in this Annual Report on Form 10-K. Because forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified, you should not rely on these forward-looking statements as predictions of future events. The events and circumstances reflected in our forward-looking statements may not be achieved or occur and actual results could differ materially from those projected in the forward-looking statements. Some of the key factors that could cause actual results to differ from our expectations include:

- our ability to successfully refinance our term loan at reasonable rates and customary economics prior to its contractual maturity date of December 20, 2023 and therefore continue as a going concern;
- the sufficiency of our cash resources and needs for additional financing;
- our inability to fulfill our customers’ orders due to supply chain delays, access to key commodities or technologies or events that impact our manufacturers or their suppliers;
- our ability to anticipate technological shifts;
- our ability to generate positive returns on our research and development;
- changes in the rate of communications service providers’, or CSPs’, deployment of, and investment in, ultra-broadband network capabilities;
- the lack of predictability of revenue due to lengthy sales cycles and the volatility in capital expenditure budgets of CSPs;
- our ability to return to operating profitability in the future;
- our ability to further penetrate our existing customer base and obtain new customers;
- changes in our pricing policies, whether initiated by us or as a result of competition;
- the amount and timing of operating costs and capital expenditures related to the operation and expansion of our business;
- the ongoing effects of the COVID-19 pandemic on our supply chain;
- the actual or rumored timing and success of new product and service introductions by us or our competitors or any other change in the competitive landscape of our industry, including consolidation among our competitors or customers;
- our ability to successfully expand our business domestically and internationally, including our ability to maintain the synergies we have realized from our acquisition of NetComm Wireless Limited, or NetComm;
- insolvency or credit difficulties confronting our customers, which could adversely affect their ability to purchase or pay for our products and services, or confronting our key suppliers, which could disrupt our supply chain;
- future accounting pronouncements or changes in our accounting policies;
- stock-based compensation expense;

- our overall effective tax rate, including impacts caused by the relative proportion of foreign to U.S. income, the amount and timing of certain employee stock-based compensation transactions, changes in the valuation of our deferred tax assets and any new legislation or regulatory developments;
- increases or decreases in our expenses caused by fluctuations in foreign currency exchange rates;
- increases or decreases in our expenses caused by fluctuations in interest rates;
- global impacts of inflation and actions taken by central banks to counter inflation;
- the costs and possible outcomes of any contingent liabilities, as well as legal actions or proceedings against us, including those described under “Part I, Item 3 – Legal Proceedings”;
- general economic conditions, both domestically and in foreign markets, including new macro-economic recession concerns, a potential economic downturn, or inflationary conditions;
- our ability to obtain and maintain intellectual property protection for our products; and
- our use of proceeds from our initial public offering.

Except as required by applicable law, we do not plan to publicly update or revise any forward-looking statements contained herein, whether as a result of any new information, future events or otherwise.

SUMMARY OF THE MATERIAL RISKS ASSOCIATED WITH OUR BUSINESS

Our business is subject to numerous risks and uncertainties, including those described in Part I, Item 1A "Risk Factors" in this Annual Report on Form 10-K. The principal risks and uncertainties affecting our business include the following:

- We are a party to a credit agreement with JPMorgan Chase Bank, N.A., as administrative agent, various lenders and JPMorgan Chase Bank, N.A. and Barclays Bank PLU, providing for a (i) a term loan of $300 million, or the Term Loan, which is secured by, among other things, a first priority security interest, subject to permitted liens, in substantially all of the Company's assets and all of the assets of certain of its subsidiaries and a pledge of certain of the stock of certain of its subsidiaries, in each case subject to specified exceptions. The Term Loan matures on December 20, 2023. Outstanding borrowings were $226.0 million at December 31, 2022. Because the Term Loan matures within one year and the Company, as of the filing date of this report, does not have committed financing or available liquidity to meet such debt obligations if they were to become due in accordance with their current terms, there is substantial doubt about our ability to continue as a going concern. We have engaged an advisory investment banking firm to assist us in pursuing refinancing options with our current Term Loan lenders, however, the likelihood of success of such efforts to secure refinancing prior to December 20, 2023 in an amount sufficient to continue operations cannot be definitively determined at this time.
- We believe the CSP industry is in the early stages of a major architectural shift toward the virtualization and cloudification of networks and the use of networks with distributed architectures. If the architectural shift does not occur, if it does not occur at the pace we predict, or if the products and services we have developed are not attractive to our customers after such shift takes place, our revenues could decline.
- If we do not successfully anticipate technological shifts, market needs and opportunities, and develop new products and product enhancements that meet those technological shifts, needs and opportunities, we may not be able to compete effectively.
- Our success depends in large part on CSPs' continued deployment of, and investment in, ultra-broadband network capabilities and technologies that make use of our solutions.
- Our continued growth depends on the pace and level of our customers' investment in 5G and 5G-related technologies, as well as our success in selling our 5G products to our existing and new customers.
- We face intense competition, including from larger, well-established companies, and we may lack sufficient financial or other resources to maintain or improve our competitive position.
- Timing of large orders and seasonality in our revenue may cause our quarterly revenue and results of operations to fluctuate and possibly decline materially from quarter to quarter.
- Our sales to the CSP market are volatile and our sales cycles can be long and unpredictable. As a result, our sales and revenue are difficult to predict and may vary substantially from period to period, which may cause our revenue and results of operations to fluctuate and possibly decline significantly.
- We expect certain of our customers will continue to represent a substantial portion of our revenue.
- If we are unable to sell additional products to our existing customers, our revenue will be adversely affected.
- Our converged cable access platform, or CCAP, solutions currently represent a significant percentage of our product sales and there is an expected transition to virtualized CCAP solutions by our cable broadband customers; our business would be adversely affected in the event we are unable to sell one or more of our CCAP products due to this expected technology transition, or the move to virtualized CCAP solutions does not offset any declines in our CCAP product offerings.
- Our products are necessary for the operation of our customers' broadband service operations. Product quality problems, warranty claims, services disruptions, or other defects, errors or vulnerabilities in our products or services could harm our reputation and materially adversely affect our business, financial condition, results of operations and prospects.
- Because we depend on third-party manufacturers to build our hardware, we are susceptible to manufacturing delays and pricing fluctuations that could prevent us from delivering customer orders on time, if at all, or on a cost-effective basis, which may result in the loss of sales and customers.

- Because some of the key components in our products come from limited sources of supply, we are susceptible to supply shortages or supply changes, which could disrupt or delay our scheduled product deliveries to our customers and may result in the loss of sales and customers.
- Rising inflation rates could negatively impact our revenue and profitability if increases in the prices of our products and services or a decrease in customer spending results in lower sales.
- We have outstanding debt that could limit our ability to make expenditures and investments in the conduct of our business and adversely impact our ability to obtain future financing.
- Litigation could distract management, increase our expenses or subject us to material monetary damages and other remedies.
- We may continue to experience the negative effects of the COVID-19 pandemic on our supply chain, which has had, and may continue to have, an adverse effect on our revenues and results of operations.
- Assertions by third parties of infringement or other violations by us of their intellectual property rights, or other lawsuits asserted against us, could result in significant costs and materially adversely affect our business, financial condition, results of operations and prospects.
- Our indemnification obligations to our customers and business partners for claims of intellectual property infringement or misappropriation are relatively broad in scope and could result in significant liability for us.
- Our results of operations are likely to vary significantly from period to period and be unpredictable. If we fail to meet the expectations of analysts or investors, the market price of our common stock could decline substantially.
- The market price of our common stock has been volatile in the past and may be volatile in the future, which could result in substantial losses for investors.
- Insiders have substantial control over us, which could limit the ability of non-insiders to influence the outcome of key transactions, including a change of control.
- A significant portion of our total outstanding shares may be sold into the public market at any time, which could cause the market price of our common stock to drop significantly, even if our business is doing well.
- Anti-takeover provisions in our restated certificate of incorporation and our amended and restated bylaws, as well as provisions of Delaware law, might discourage, delay or prevent a change in control of our company or changes in our management and, therefore, depress the trading price of our common stock.
- Changes in U.S. and foreign tax rules and regulations, or interpretations thereof, may give rise to potentially adverse tax consequences and adversely affect our financial condition.

PART I

Item 1. Business.

Overview

With our physical, virtual and cloud-native 5G infrastructure and customer premise networking equipment solutions, we help our CSP customers transform and expand their public and private high-speed data and multi-service communications networks so they can meet the growing demand for bandwidth and new services. Our core and edge convergence technology enables CSPs and enterprises to cost-effectively and dynamically increase network speed, add bandwidth capacity and new services, reduce network complexity, and reduce operating and capital expenditures regardless of access technology.

We offer scalable solutions that can meet the evolving bandwidth needs of our customers and their subscribers. Our first installation in a service provider's network frequently involves deploying our broadband products in only a portion of the provider's network and, for our cable products, with only a fraction of the product's full capacity enabled at the time of initial installation. Over time, our customers have generally expanded the use of our solutions to other areas of their networks to extend network coverage or increase network capacity.

Our solutions are commercially deployed in over 70 countries by more than 475 customers, including regional service providers as well as some of the world's largest Tier 1 CSPs, serving millions of subscribers. Our principal customers include Charter Communications, Rogers, Videotron, T-Mobile, Verizon, AT&T, Bell Canada, Cable One, Mediacom, Windstream, and Lumen in North America; Televisa/IZZI Mexico, Megacable Mexico, Cablevision Argentina, Claro Brazil, America Móvil and Claro Colombia in Latin America; Liberty Global, Vodafone and DNA Oyj in Europe; and NBN, Jupiter Communications, Beijing Gehua CATV Networks, Softbank, Kbro, Guangdong Cable, TRUE and CNS in Asia-Pacific.

Our revenue for the years ended December 31, 2022, 2021 and 2020 was $286.5 million, $401.3 million, and $393.2 million, respectively. Our net (loss) income for the years ended December 31, 2022, 2021 and 2020 was $(79.2) million, $3.2 million, and $24.8 million, respectively. As of December 31, 2022, and 2021, our total assets were $398.3 million and $468.7 million, respectively.

Industry Trends that Drive our Growth

Annual Increase in Demand for Bandwidth

Demand for both downstream and upstream bandwidth from consumers and enterprises has grown substantially and is expected to continue to increase. Key drivers of increased bandwidth demand include:

- more users with more connected devices and applications;
- more time spent online by users;
- increased use of bandwidth-intensive streaming media services, such as Amazon Prime Video, Disney+, Netflix, Hulu and YouTube; cloud applications, such as iCloud, Office 365/OneDrive, and Dropbox; and augmented and virtual reality applications;
- Internet of Things, or IoT, solutions, in connected homes, businesses and industries; connected devices such as Amazon Alexa or Google Assistant; machine-to-machine connectivity; car connectivity; and smart cities;
- growth in online, interactive gaming;
- backhaul requirements of wireless service providers, including new entrants into the wireless space such as multiple system operators, or MSOs;
- the increase in data consumption by enterprises with strict latency requirements on mission-critical and public safety-related applications;
- increasing need for greater uplink bandwidth from home or office to the cloud; and
- increased network data traffic as subscribers worked from home throughout the COVID-19 pandemic, and continuing into the future as employers adopt long-term hybrid workplace models.

Transformation of Communications Network Infrastructure

To meet the growing demand for utility-grade broadband connectivity, service providers are undertaking a significant transformation in network architecture from the core of the network all the way through to the customer premise equipment, or CPE. Three key trends are evident in this transformation and, we believe, are important for our growth: densification, network convergence, and cloudification.

- *Densification.* Increasing demand for bandwidth and user expectations for ubiquitous, seamless and reliable connectivity require the addition of more access points at the network edge and at customer premises for users to connect to broadband networks, a transformation also known as *network densification*. As a result, CSPs across all access technologies are shifting from centralized to more distributed architectures. Densification requires extending network connectivity and distributing access aggregation solutions closer to end users. For cable operators this entails deploying more access aggregation nodes and reducing the size of service groups per node. For wireless operators, particularly in 5G, this will lead to an emphasis on small, versus traditional macro, cells in new network deployments.

- *Network Convergence.* Traditionally service providers have deployed separate, siloed networks to deliver both fixed (cable, fiber or copper DSL) and mobile broadband to their subscribers. To meet the demands of next generation networks and to realize greater cost efficiencies in network deployment and operation, service providers are focused on converging these siloed fixed and mobile core networks into a single converged 5G core. The 5G core will be the heart of the network and act as an anchor point for multi-access technologies to deliver a seamless service experience across fixed and wireless access technologies. 3GPP, the global wireless standards body, has defined a new 5G core architecture that supports service delivery over wireless, fixed or converged networks.

- *Network virtualization and Cloudification ("Networking as a Service").* Increased consumption of video and other high-bandwidth applications that demand low latency are forcing CSPs to fundamentally rethink their data networks. Network virtualization, in which network software is decoupled from dedicated servers and re-deployed on commodity hardware, was a first step in transforming networks. Virtualization enables several significant benefits to service providers, such as increased operational efficiency, upgradability, configuration flexibility, service agility and scalability. But to meet 5G specifications that call for new or enhanced features, like software-defined networking, multi-access mobile edge computing, and rapid deployment of network slices, additional network architecture modification will be required. We believe that network cloudification is the path forward to solve this challenge, where network functions will be hosted in edge data centers with access delivered through the Internet (public cloud) or via private networks (private cloud). We believe that cloudified networks will provide better support for scalability, agility, innovation, and low latency application and service delivery, as well as the potential for significant cost savings.

Adoption of 5G

- *Fifth Generation, or 5G, Mobile Networks.* 5G, the latest generation of cellular technology, is changing the way people live and work. 5G enables a significant increase in the amount of data transmitted over wireless networks due to more available bandwidth and advanced antenna technology. Engineered to provide speeds higher than 2 Gbps, 5G also offers improved capacity, scale, latency and reliability. In upgrading to 5G, CSPs will require new core and access infrastructure. By 2028, some estimates predict that 85% of the world's population will be covered by 5G networks, and 5G subscriptions are forecast to grow to 5.0 billion. As a result, we believe that demand from our existing and new customers for our 5G core, access infrastructure and customer premise devices will be an important driver of our growth for the next several years.

- *5G Fixed Wireless Access, or FWA, likely to become mainstream.* A key component of 5G networks will be the promotion of FWA to a more mainstream broadband access medium. FWA services use the mobile network to deliver high-speed fixed broadband connections in areas where there may not be existing high-speed fixed broadband services and where it may not be feasible or cost-effective to deploy other high-speed access technologies such as fixed-line DSL, hybrid fiber coaxial cable, and fiber-to-the-premise. While FWA is not a new broadband technology, until recently the technology was unable to replicate the speed and reliability of fiber broadband. As a result, its deployment was mainly limited to remote communities in under-served rural areas. However, with the introduction of 5G, breakthroughs in FWA technology, and access to millimeter wave spectrum, these technical limitations no longer exist. FWA now has the potential to move from a niche access technology alternative in rural markets to a more mainstream access medium that includes residential suburban and urban markets, as well as enterprise campuses.

Accelerating Adoption of Virtualization Solutions and Distributed Access Architectures by Major Cable Operators

We believe major cable operators are rapidly moving toward more software-driven architectures and virtualized software solutions. Virtualized software solutions that are decoupled from underlying hardware and run on commercial-off-the-shelf, or COTS servers and/or cloud-native architectures allow for significantly increased efficiencies, upgradability, configuration flexibility, service agility and scalability not feasible with hardware-centric approaches. We believe a software-based cable access solution can significantly reduce cable operator facility costs, especially costs related to physical space and power consumption, and increase operational efficiency, and that the deployment of these systems will be an important step in cable operators' transition to all-IP networks.

In addition to centralized cable access solutions, we believe there is accelerating interest in distributed access solutions, particularly in competitive gigabit service markets where cable operators are competing with fiber-to-the-home (FTTH) services and are extending fiber networks deeper into their access networks. A distributed access architecture (DAA) coupled with a software-based cable access solution running on COTS servers at a headend, and the distribution of DAA nodes closer to end users, alleviates the power and space requirements of centralized systems at headend sites due to the fact that the radio frequency (RF) processing is distributed into the field outside of the headend. We believe this distributed architecture will enable service providers to efficiently scale to support growth.

Market Opportunity

We believe that our products are well suited to address these trends and accordingly present us with a significant market opportunity across all access technologies. Historically, we have generated the significant majority of our revenue from the cable market with our converged cable access platform, or CCAP. However, since 2019 we have become more diversified as a result of our acquisition of NetComm and the introduction of solutions for wireless and fixed-line broadband networks.

We expect to continue to generate revenue in the future from growth in the cable market and increased revenue from sales of both wireless and fixed-line broadband solutions to new and existing customers. We believe there is an opportunity for us to take new market share as wireless and fixed-line broadband networks continue to converge.

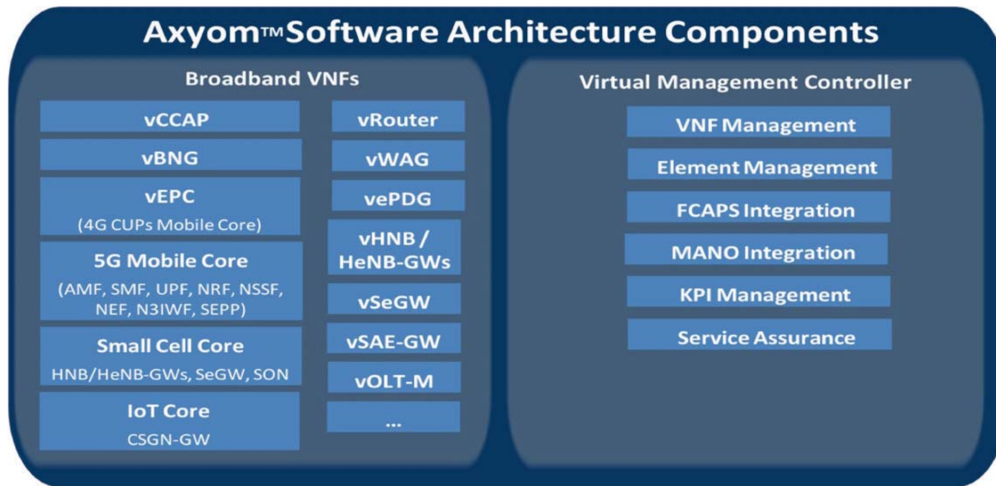
Key Benefits of Our Solutions

Highly Flexible, Service-Oriented, Cloud-Native Architecture

Our multi-service broadband platform, Axyom, is at the heart of all of our core network infrastructure products. Axyom is a web scale solution based on a distributed micro-service framework. The Axyom Software Platform includes our virtual software workloads and the software that manages those micro-services. The Axyom software architecture includes virtual network functions, or VNFs, for all CSPs – mobile, fixed, cable and converged. Our VNFs are developed from the ground up using cloud native principles to not only ensure scalability and flexibility but to ensure that the Axyom VNFs are optimized for the virtual computing environment in which they will run.

Our Axyom software platform offers a large catalog of ultrabroadband services, while our Axyom Virtual Management Controller, or VMC, provides life-cycle VNF Management, element management system functions and Northbound interfaces to Network Function Virtualization, or NFV, Orchestrators and SDN Controllers. With the ability to support multiple

application level key performance indicators, or KPIs, the VMC provides the control and visibility needed to orchestrate large numbers of VNFs instances running simultaneously and to manage them through their lifecycle.



Each Casa VNF is designed around the following design principles:

- Supports **stateless processing** – Axyom VNFs are designed to use a centralized in-memory data store for state and subscriber/session information.
- Can be **orchestrated** – Axyom VNFs have been integrated with several industry leading orchestration solutions, such as NetCracker, HP Enterprise and Amdocs.
- Composed of **microservices** – Our microservices operate at web-scale and can be individually managed. They include core microservices that implement business logic and support microservices that support all VNFs. Overall Axyom microservices are designed to be self-contained so that they can be individually upgraded and also chained clustered into VNFs and services. This cloud native approach provides maximum flexibility and operational efficiency.
- Supports **convergence solutions** – Many service providers serve a combination of mobile, fixed and cable broadband subscribers. Our Axyom software platform not only delivers optimized solutions specific to mobile, fixed and cable broadband networks, but Axyom is also designed to support converged solutions. We also provide microservices that can share a common User Plane Function, or UPF, in a multi-access environment, capabilities that provide service providers with common and superior resource management.
- Allows **location independence** – Our core network solutions are disaggregated, allowing control and user plane compute resources to be located in the right place for specific use cases. As an example, if the goal is low latency, Axyom allows the user plane VNF to be located on an edge server.
- Enables **deployment flexibility** – Our Axyom software platform provides flexibility since it allows service providers to transition from current monolithic, legacy solutions to Axyom VNFs that can be run on bare metal or in virtual environments, either virtual machines or containers.

End-to-End Products on a Converged Core and Multi-Access Intelligent Edge

We offer a full end-to-end portfolio of all-access broadband network solutions that extend from a cloud-native, converged network core to the customer premises. Our products help CSPs deploy more capacity at the network edge, closer to where end users and devices are accessing the network, thereby increasing available bandwidth and reducing latency to improve quality of service. In addition, our converged network core supports wireline and wireless access and avoids separate cores for each access type with overlapping functions (subscriber management, session management, transport security, access aggregation and radio frequency, or RF, management) within the network. This enables operators to reduce long-term capital expenditures and operating expenses. Our convergence solutions may also enable operators to more consistently deliver services and execute policy across different access types.

Ability to Upgrade Networks Remotely with Rapid, Seamless Addition of Bandwidth Capacity

We designed our programmable architecture to enable rapid and seamless expansion of network capacity with the purchase of additional software licenses. This flexible approach helps CSPs respond to increased customer demands with rapid bandwidth and service provisioning.

Additionally, our programmable architecture allows us to deploy technology updates to our customers remotely without the expense, disruption or network downtime caused by hardware replacements or field visits by personnel, while minimizing network downtime. We can remotely implement additional features or capacity in order to scale our solutions to meet the needs of our customers as they look to broaden the use and capabilities of our solutions. Similarly, we are often able to troubleshoot and assist our customers with technical issues through seamless software updates.

Reduced Network Complexity and Lower Total Cost of Ownership

Our converged software platform allows CSPs to significantly reduce the complexity, footprint requirements and costs of their networks by reducing parallel and otherwise redundant network architecture. The large capacity increases that our solutions enable, and the ability of our solutions to deliver broadband services over a converged core, translates to fewer pieces of equipment in the network and lower energy usage, operating costs and capital expenditures.

Our Growth Strategy

The key elements of our growth strategy are:

Continue to Innovate and Extend Technology Leadership Through R&D Investment

We believe that we offer market-leading broadband infrastructure solutions today. We intend to continue to enhance our existing solutions and develop new solutions in both our current and adjacent markets. For example, we have invested in and launched distributed access architecture solutions to allow our cable customers to densify their networks, providing higher bandwidth, which enhances user experience. Additionally, we have been investing in our core and access solutions for 4G/LTE and 5G wireless networks.

Further Penetrate Existing Customers

Our customers often deploy our solutions in a specific region or for a specific application, which may only account for a portion of their overall network infrastructure needs. We plan to expand our footprint within the networks of existing customers as they realize the technological and financial benefits of our solutions, as well as sell our new solutions to them as they offer new broadband services to their subscribers.

Expand our Customer Base by Expanding the Breadth of Solutions Sold to Customers

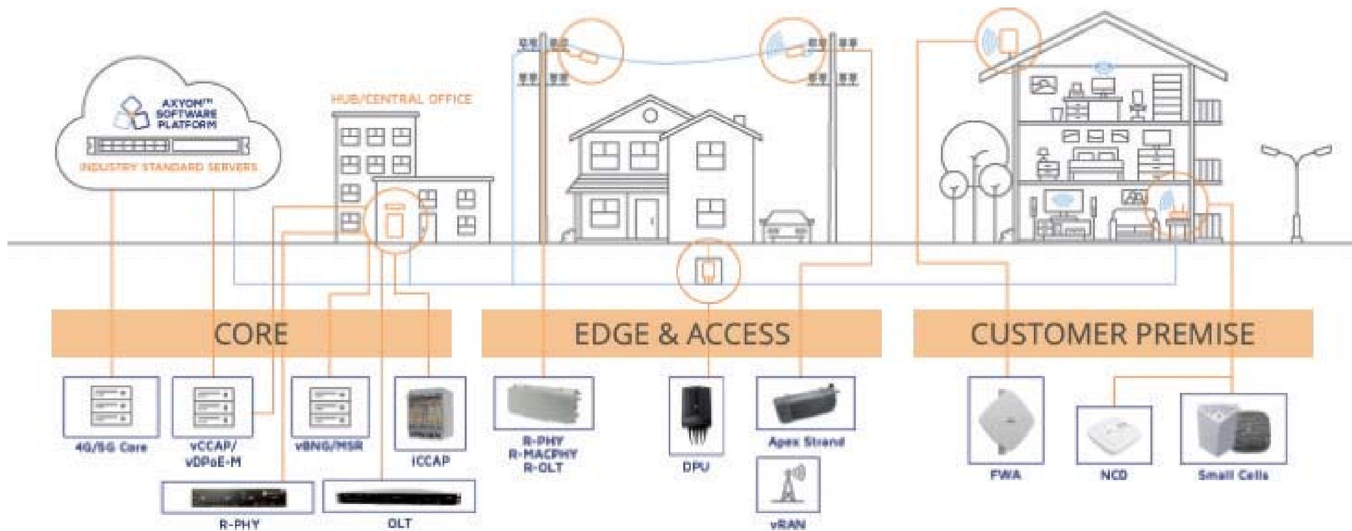
We intend to sell additional solutions to our growing installed base of CSPs, particularly as they increasingly offer converged services to their subscribers. We have invested in developing a cloud-native platform that allows us to rapidly provide new applications and services to our customers. While we initially focused on providing solutions for cable service providers due to our founders' experience in the cable industry, the commonalities between fixed and wireless network architectures have allowed us to expand our solutions into the wireless and fixed-line broadband markets. Our wireless and fixed-line broadband solutions have been purchased by several customers, including Tier 1 network operators globally.

Invest in Our Platform through Selective Acquisitions

We may selectively pursue acquisitions that enhance our existing platform capabilities and are consistent with our overall growth strategy. For example, on July 1, 2019, we acquired NetComm for cash consideration of $162.0 million Australian dollars, or AUD ($112.7 million United States dollars, or USD, based on an exchange rate of USD $0.700 per AUD $1.00 on July 1, 2019). This acquisition has enabled us to expand our customer base, enhance our global footprint, extend our product portfolio to the far edge of the network, and further diversify our revenue sources.

Solutions and Technology

We offer end-to-end cloud-native, virtual, physical and distributed infrastructure and customer premise network solutions that enable our customers to provide wireless and fixed-line broadband services to consumers and enterprises.



Wireless

Network Core

- *Virtual Evolved Packet Core, or vEPC.* Virtualizing the LTE EPC allows service providers to reduce network operating costs, improve network efficiency and deploy new services faster. Built from the ground up, our vEPC is optimized for virtualized environments and implements control and user plane separation, or CUPS. It can be deployed stand alone or in conjunction with our other core network products, such as our Security Gateways and Small Cell Gateways.
- *5G Core.* We built our 5G core, converged to support wireless and fixed-line broadband networks, to help service providers implement the shift from a single, one-size-fits-all core network toward a core that provides different logical networks, or "slices", for different traffic requirements to support new use cases, including IoT, Enhanced Mobile Broadband, and Mission Critical Services. Our 5G core delivers several important features including:
  - higher Gbps per vCPU;
  - a solution deployable in containers with virtual machines, or VMs, or bare metal;
  - location-independent placement of the control and user planes in a CUPS architecture;
  - a smooth migration from 4G to 5G with efficient internal messaging between 4G and 5G network components; and
  - network slicing in a service-based architecture.
- Other elements of our core infrastructure network solutions include our Security Gateway, which enables secure encrypted access for subscribers roaming between trusted and untrusted networks, while providing high levels of density and performance, and our Wireless Gateway, which enables routing and security functions as well as traffic management, to provide secure connectivity for wireless endpoints and to enable broadband services such as LTE over Wi-Fi, including Wi-Fi calling.

Small Cell solutions

- *Apex Family of Small Cells.* Our portfolio of indoor and outdoor Apex small cell solutions consists of remotely deployable access points that provide cellular connectivity services at the network edge in conjunction with transport security functions to address coverage and capacity challenges. These solutions allow CSPs to more cost-effectively densify their networks while simultaneously improving coverage and enhancing throughput. Our small cell portfolio includes our:
    - Lifestyle residential small cell, the Apex Pebble, which uses the user's broadband connection rather than a cell tower connection to provide wireless service in areas outside of the operator's coverage areas. We believe that our Apex Pebble offers unique features that include:
        - attractive design that is intended to drive better acceptance by subscribers and thereby provide better RF coverage than utilitarian-looking small cells that are likely to be hidden away in places that reduce RF propagation; and
        - untethered Wi-Fi backhaul option, versus the ethernet backhaul requirement in comparable traditional femtocells, which allows a user to place the device anywhere in his or her home where Wi-Fi is available without running or connecting additional cables to a home router.
    - Apex enterprise small cell with 4G radio capability, which supports two LTE carriers, in a small form factor.
    - Apex Strand solution, which is designed for both MSOs and mobile network operators, supports two LTE carriers (licensed LTE bands or citizens band radio service, or CBRS), and takes advantage of existing hybrid-fiber cable, or HFC, strand to help solve the power, backhaul and siting issues that accompany large-scale small cell deployments.
    - 5G indoor small cell, which offers support for licensed LTE/5G bands and eventually CBRS and C-Band and is designed for environments with a large number of subscribers or where a larger coverage area is required. Our 5G indoor small cell helps our wireless customers meet the coverage and capacity challenges in dense urban and suburban areas where large numbers of NR and LTE devices are present. The 5G indoor small cell All-in-One package includes the baseband unit and the radio remote unit with flexible external antenna configurations. It also supports open radio access network defined interfaces for centralized and virtualized radio access network deployments.

Axyom Element Management System, or AeMS

- We designed our AeMS to make small cell deployment and management more efficient for service providers as they expand and evolve their mobile access networks. Our virtualized AeMS provides full life-cycle management, which allows the provider to manage large scale deployments of small cells within complex network environments. It includes key management tools that facilitate integration with existing networks and increase radio access network utilization with zero-touch plug and play configuration of small cells. The AeMS provides visibility and access to all modules from a single-pane-of-glass dashboard, which gives service providers the ability to monitor and control small cells efficiently and effectively. In 2020 we expanded our AeMS to use cases beyond small cell deployment management and have connected our distribution point unit, or DPU. In future years, we expect to add to our fixed wireless access solutions.

Fixed Wireless Access

- Our Fixed Wireless Access, or FWA, solutions enable service providers to offer fixed, ultra-broadband services to their customers where the service provider does not own copper, fiber or coaxial cable to the customer premise, or where these access media are not cost-efficient to deploy. Connections are instead serviced by a 3GPP compliant wireless connection in a manner that optimizes overall network efficiency and provides a higher grade of broadband service than would typically be achieved via a typical mobile handset. Our fixed wireless solutions support 4G and 5G, including our newly launched 5G millimeter wave FWA device. These can be delivered as self-install indoor units or as pro-install outdoor units that are mounted to the side of the customer premise. We designed our portfolio with a heavy emphasis on reducing the total cost of ownership for operators, achieved through class-leading hardware performance and build quality and our range of install accessories that optimize the installation process and overall install success rate.

Cable

Our solutions for cable service providers can be deployed in a centralized, distributed or virtual environment. While centralized deployments allow our customers to deploy all critical CCAP functions in a single location, distributed and virtual deployments enable our customers to densify the access network by distributing access deeper into the network, away from existing data centers.

Virtual Deployment

- Cable service providers are actively evaluating virtualized versions of network functions, as well as software-defined networking control and orchestration to enable faster service creation and more nimble response to changes in service and bandwidth demand. In cable access networks, this trend is accompanied by fiber-deep strategies that push required ultra-broadband bandwidth closer to subscribers. Our Distributed Access Architecture, or DAA, solutions and virtual converged cable access platform, or vCCAP, create a secure, scalable, high-performance next-generation cable access network.
- Our vCCAP provides all the features of our C100G CCAP on COTS servers in a flexible architecture that enables independent scaling of control and data planes. We built our vCCAP on our Axyom modular software framework for the cloud from the ground up. It delivers high performance and deployment flexibility in edge or core environments. Our virtual solutions also enable migration from physical network functions, or PNFs, to VNFs with a common management interface to both.
- While our customers continue primarily to rely on their existing i-CCAP infrastructure to provide gigabit broadband service to their customers, our vCCAP and DAA products have been deployed by several of our customers, and as of December 31, 2022, we are currently in over 70 trials with our customers globally.

Centralized Deployment

Integrated CCAP – C100G and C40G

- Our C100G CCAP combines (i) cable modem termination system, or CMTS, functionality, which enables IP data transport from data centers to end users over cable networks, including voice over IP, or VoIP, and (ii) edge-quadrature amplitude modulation, or Edge-QAM, functionality to enable video delivery over cable networks in one integrated chassis. We believe our C100G CCAP was the first solution offering full CCAP functionality, allowing the delivery of voice, video and data on a single platform. Our C100G CCAP also features high downstream speeds of up to 10 gigabits per second, high upstream channel capacity, and low space and energy consumption requirements. Using our C100G CCAP, our customers whose networks are configured for DOCSIS 3.0 can adopt DOCSIS 3.1 through either a software upgrade or a simple line card addition, while continuing to service their customers who use DOCSIS 3.0 modems. We are also able to increase capacity for our C100G CCAP through channel expansions, which are delivered via software-enabled increases in bandwidth capacity. We believe that our software-centric approach will enable us to seamlessly provide our customers with future updates as standards evolve.
- In addition to our C100G CCAP, we also offer our C40G CCAP, which provides per rack unit performance comparable to that of our C100G CCAP, but in a smaller form factor.
- Our CCAP solutions offer three key differentiating applications compared to a single cable network:
    - *DOCSIS Core.* Provides high-speed delivery of IP data for broadband connectivity services, including VoIP.
    - *Video Core.* Delivers high-speed video processing, including for HD and 4K.
    - *Intelligent Routing.* Intelligently manages network traffic to optimize service quality.

Distributed Deployment

- DAAs offer a new approach for service providers that are looking to increase capacity in their networks. Our family of DAA solutions is designed to help service providers push capacity to the network edge to improve the services their subscribers enjoy, extract more value from existing investments, and maintain smooth operations in the transition from centralized to distributed access architectures.

- Our family of DAA solutions includes:
  - o Physical or virtual CCAP cores that deliver full CCAP and full spectrum DOCSIS 3.1 support and are compliant with CableLabs' interoperability standards.
  - o The CCAP Service Card, or CSC, deployable in our C100G or C40G chassis, which provides the complete DOCSIS and Edge-QAM media access control, or MAC, functions as well as traffic aggregation for the DAA nodes or shelves.
  - o A range of DAA node and shelf form factors that perform complete DOCSIS and EQAM physical layer, or PHY, or MAC/PHY functions. Our remote PHY, or R-PHY, solutions for cable networks retain software-driven network control and intelligence functions at the network core while placing physical layer functions remotely in a fiber node and the network edge. Our remote MAC/PHY, or R-MAC/PHY, solution for cable networks offers the capabilities of our R-PHY solution while also moving media access control functions from the network core to remotely deployed R-MAC/PHY nodes.
  - o 10G Ethernet transport between the CCAP core and the DAA nodes.

Bandwidth Capacity Expansion

- *Software.* Our customers can add additional bandwidth capacity to their CCAP solutions by purchasing perpetual software license upgrades. Our software platform also permits additional features to be provisioned remotely, as compared to hardware-centric solutions, which require wholesale hardware replacements. As new standards and services evolve and broadband networks become increasingly virtualized, we expect we will be able to deliver additional capabilities as software-only updates.
- *Line cards*. Our customers may also purchase additional bandwidth in the form of our upstream and downstream line cards. Our line card expansion options allow our customers to rapidly add new service interfaces and physical connection capacity without the need for chassis replacements. In addition, our expansion cards can cost-effectively enable support for our distributed access solutions utilizing the same C100G CCAP chassis.

Fixed-Line Broadband

Optical Access Solutions

- Along with our centralized and distributed deployment solutions, we offer a portfolio of Passive Optical Network, or PON, solutions for centralized and distributed PON architectures that enable service providers to move fiber closer to the network edge and deliver a broader range of ultra-broadband services more efficiently and at higher speed. Our PON solutions include next generation 10G EPON and XGS PON alternatives, including optical line terminals and optical network units. We also offer a DOCSIS Provisioning over Ethernet system for seamless integration of our PON solutions with existing DOCSIS network protocols.

Virtualized Broadband Network Gateway Router and Multiservice Router

- Our virtualized broadband network gateway, or vBNG, router provides advanced subscriber management and routing capabilities in a cloud-native, virtualized solution. By separating the control and data plane functions, our vBNG enables elastic scaling and service agility, while allowing the service provider to put the control and data planes where they make most sense. Accordingly, our vBNG can be deployed in either centralized architectures (on the same server in the data center or central office) or distributed ones (at the network edge or node closer to the end user). Our vBNG is deployed as a service on our Axyom NFV Framework. It is convergence-ready with built-in access gateway functions, or AGF, interfacing with our 5G core. We support data plane slicing based on service (converged/legacy) with dynamic control of the slice from our 5G core. At the 2019 Broadband World Forum, we demonstrated how our vBNG and 5G core could enable subscribers to use services seamlessly as they move between mobile and fixed connectivity. This solution won us the Broadband Forum Innovation Award for 5G in 2019.
- Our fixed-line broadband portfolio includes our disaggregated Multi-Service Router, or MSR. Our MSR is built on commercial off-the-shelf switching platforms that use merchant silicon. Our MSR supports the BNG data plane on merchant silicon. It offers industry-leading throughput and capacity in a one rack-unit form factor. Our MSR operates with the vBNG control plane being separated on a server at any centralized location or integrated right within the switch CPU. Service providers therefore can pick and choose the type of data plane at each location based on scale and throughput needs. Our MSR is also a full-fledged Provider Edge, or PE, router. It supports layer 2 multi-protocol layer switching and layer 3 virtual private networks with resource reservation

protocol for traffic engineering and Fast Re-route, a technology to provide fast traffic recovery upon link or router failures for mission critical services. It also supports edge access functions. Our MSR therefore offers the functionality of a BNG, PE Router, and Top-of-Rack switch all rolled into one.

- Our customers use our vBNG to support their next-gen PON and multi-access edge computing deployments. As an example, we demonstrated an end-to-end solution using our G.fast DPUs and 10G XGS-PON ONTs working with our XGS-PON OLT-A product connecting to a multi-tenant vBNG. This solution offers a smooth migration path for telecommunications providers from digital subscriber line, or DSL, technologies to G.fast to fiber-to-the-home, while maintaining the same vBNG edge functions. Multi-tenancy allows customers to slice the same hardware infrastructure at the edge to different access methods based on service needs.

Fiber Extension (Fiber-to-the-Distribution-Point)

- Our Fiber Extension (Fiber-to-the-Distribution-Point), or FTTdp, solutions allow service providers to extend the fiber running in the street or basement, utilizing the copper lead-ins at an end user's premises. The solution consists of a distribution point unit, or DPU, which is installed outside of the home or in the basement of a multi-dwelling unit and a Network Connection Device, or NCD, which is installed inside the home. Our DPUs are reverse powered from the NCD when there is no power source available at the location of the DPU and where installing local power is costly and time consuming for the service provider. Our FTTdp solutions offer a cost- and time-effective means to provide a fiber-to-the-home experience to the end user and the operator, reducing time delays and cost overruns where the fiber penetration into buildings becomes problematic. Our portfolio focuses on cost optimization for service providers, with solutions ranging from software through to accessories that enhance the installation process.

Residential Broadband

- We sell residential broadband gateways for customer premises in Australia and New Zealand. We added these devices to our product portfolio from our acquisition of NetComm. These devices allow customers to connect to very high-speed DSL, or asymmetric DSL, or fiber services including fiber-to-the-node, -basement, and -home services when available. Our fixed-line broadband devices range from entry level gateways to high-performance devices that support triple-play services covering high-speed data transmission, multi-HD/4K IPTV and over-the-top video streaming, as well as high quality VoIP phone calls. We combine the latest generations of Wi-Fi with our powerful CloudMesh portfolio of Wi-Fi mesh hardware, automated Wi-Fi optimization software and Wi-Fi analytics. These options ensure fast and reliable connections to multiple devices throughout the home and office, while also optimizing costs for the operator by reducing support call loading.

Machine-to-Machine, or M2M, and Industrial Internet of Things, or IIoT

- Our M2M and IIoT routers provide businesses and governments with networking products that are enabled for 3G and 4G/LTE data communication. We designed these routers for applications such as retail, transportation, health, metering digital signage, security, banking and mining. These solutions enable remote diagnostics, real-time monitoring, and wireless access via the Internet. Our routers are designed to withstand harsh environmental conditions and extreme temperatures. Dual file-system management enhances solution reliability, while integrated open-source software development kits enable customers to customize our routers for specific-use cases.

Our Customers

Our solutions are commercially deployed in over 70 countries by more than 475 customers, including some of the world's largest Tier 1 CSPs, serving millions of subscribers:

- in North America: Charter Communications, Rogers, Videotron, T-Mobile, Verizon, AT&T, Bell Canada, Cable One, Mediacom, and Lumen;
- in Latin America: Televisa/IZZI Mexico, Megacable Mexico, Cablevision Argentina, Net Brazil, America Móvile and Claro Colombia;
- in Europe: Liberty Global, Vodafone, Telefonica and DNA Oyj; and
- in Asia-Pacific: Jupiter Communications, Beijing Gehua CATV Networks, NBN, Guangdong Cable, TRUE and Softbank.

Sales and Marketing

We sell our solutions and services through our direct sales force and in partnership with our resellers and sales agents. Our sales force is supported by our sales engineering team, which has deep technical expertise and the capability for product presentations, product evaluations, trials and customer care. Each sales team is responsible for specific direct end-customer accounts and/or a geographic territory across the following regions: North America, Latin America, Asia-Pacific and Europe, Middle East and Africa.

Our products typically have a long sales cycle, requiring detailed discussions with prospective customers about their network requirements and technology roadmaps. To help us succeed in a market characterized by long sales cycles, we have developed strong customer relationships, which in turn provide us with insight into how our products will be deployed in our customers' networks. We involve product engineers in the sales process, enabling them to build relationships with customers that are valuable both during implementation and in post-sales customer support. These relationships also provide us with opportunities to leverage our familiarity with our customers' needs to make additional sales following the initial sale.

We also use resellers to market, sell and support our products and services, and we use sales agents to assist our direct global sales force with certain customers, primarily in the Latin America and Asia-Pacific regions.

Our marketing activities consist primarily of technology conferences, web marketing, trade shows, seminars and events, public relations, analyst relations, demand generation and direct marketing. We undertake our marketing activities to build our brand, increase customer awareness, communicate our product advantages, and generate qualified leads for our direct sales force, as well as our resellers and sales agents.

Competition

The CSP market is highly competitive and subject to rapidly changing technology trends and shifting customer needs.

We primarily compete with larger and more established companies in the CSP market, such as Adtran, Cisco, CommScope, Ericsson, Huawei, Inseego, Nokia and Samsung, as well as a number of other suppliers of networking equipment and solutions to CSPs, such as Harmonic and Mavenir.

The principal factors upon which we compete are:

- product capabilities;
- performance, scalability, flexibility and adaptability to new standards;
- ability to innovate;
- time to market;
- customer support; and
- total cost of ownership relative to performance and features.

We believe that we compete favorably with respect to these factors. Nevertheless, many of our competitors have substantial competitive advantages, including greater name recognition, longer operating histories, and substantially greater financial, technical, research and development or other resources than we do.

Research and Development

Our research and development efforts are focused on developing new solutions for the cable, wireless and fixed-line broadband markets and enhancing our current solutions to meet the current and future needs of our customers. We aim to be first to market with deployable, innovative solutions. We are willing to invest early in research and development and take technological risks to meet these goals. We also seek to enhance our technological innovation through our partnerships with industry standard-setting organizations and groups, such as CableLabs, 3GPP, and Wi-Fi Alliance. These efforts position us to be able to advance industry standards while evolving our solutions to meet those new standards.

Manufacturing

We partner with multiple global contract manufacturing companies to manufacture the hardware for our solutions using the designs, components and standards that we specify. We conduct final assembly and quality assurance testing at our in-

house and outsourced manufacturing facilities. We believe our combination of in-house and outsourced manufacturing capabilities, assembly and quality assurance testing allows us to maintain consistent and quality product for our customers. We also believe that this manufacturing model enables us to respond quickly to technological changes and supports our engineering goal of being first to market with deployable products. We believe our inventory management enables us to offer shorter times between order and delivery to our customers as compared to our competitors.

Our contract manufacturers purchase the materials and components for our solutions through a variety of major electronics suppliers. While the majority of material and component inputs for our solutions are generally available, since 2020 we have experienced disruption from component shortages and other supply chain issues that have delayed delivery of certain products to our customers and have had a material, adverse effect on our revenue and profitability. Please refer to our Risk Factor on third-party manufacturers, under Risks Related to Supply Chain and Inventory Management.

Intellectual Property

Our success depends to a significant degree upon our ability to protect our core technology and intellectual property. To accomplish this, we rely on a combination of trade secrets, patents, copyrights and trademarks, as well as contractual protections. To date, we have focused our efforts to protect our intellectual property primarily on trade secrets.

We have obtained or applied for patents and have registered or applied for trademarks and service marks in the United States and in many foreign countries. At December 31, 2022, we held ten U.S. patents, with expiration dates through 2040, and had multiple patent applications pending with the U.S. Patent and Trademark Office. We have also registered or applied to register various trademarks and service marks in the United States and a number of foreign countries, including for Casa Systems, NetComm and our four-triangle pyramid logo.

We limit access to and use of our proprietary software, technology and other confidential information through the use of internal and external controls, including nondisclosure agreements with employees, consultants, customers and vendors and other measures for maintaining trade secret protection. We generally license our software to customers pursuant to agreements that impose restrictions on their ability to use the software, including prohibitions on reverse engineering and limitations on the use of copies. We also seek to avoid disclosure of our intellectual property by requiring employees and consultants with access to our proprietary information to execute nondisclosure and assignment of intellectual property agreements and by restricting access to our source code.

We also incorporate a number of third-party software programs into our solutions pursuant to license agreements. Our software is not substantially dependent on any third-party software, although in some cases it utilizes open source code.

Human Capital and Empowerment

Our company was founded on the principle that people are our greatest asset. We pride ourselves on our culture of innovation, which is driven by our management team of experienced executives and engineers with deep industry expertise. Our future success depends in large part on the continued service of our key technical and senior management personnel, and on our ability to continue to attract, retain and motivate qualified employees, particularly highly-skilled engineers involved in the design, development, support and manufacture of new and existing products. In order for us to attract the best talent, we aim to offer challenging work in an environment that enables our employees to learn, grow and reach their full potential.

Core to our empowerment strategy is embracing diversity and building a culture of inclusion across the organization. We are working to achieve this by expanding the diversity of our workforce, creating growth and development opportunities for our employees, embracing different perspectives and fostering an inclusive work environment for all.

As of December 31, 2022, we employed 1,043 full-time employees, of which 292 were located in the United States and 751 were located outside the United States. Our workforce as of December 31, 2022 consisted of 691 employees in engineering and research and development, 171 employees in sales and marketing, 96 employees in general and administrative, 52 employees in manufacturing and 33 employees in services and support. None of our employees are represented by unions. We consider our relationship with our employees to be good and have not experienced any interruptions of operations due to labor disagreements.

Our human capital resource objectives include identifying, recruiting, retaining, incentivizing and integrating our existing and future employees. We strive to attract and retain the most talented employees in the industry and across the globe by offering competitive compensation and benefits that support their health, and financial and emotional well-being. Our

compensation philosophy is based on rewarding each employee's individual contributions and striving to achieve equal pay for equal work regardless of gender, race or ethnicity. We use a combination of fixed and variable pay, including base salary, bonuses, and stock-based compensation. The principal purposes of our equity incentive plans are to attract, retain and motivate selected employees and directors through the granting of stock-based compensation awards. We offer employees benefits that vary by country and are designed to meet or exceed the requirements of local laws and to be competitive in the marketplace. Examples of benefits offered in the U.S. include a 401(k) plan with employer matching contributions; health benefits; life, business travel and disability insurance; additional voluntary insurance; paid time off and parental leave; paid counseling assistance; child and elder care assistance; family college planning and corporate discounts. For further information concerning our equity incentive plans, see Note 12, *Stock-based Compensation*, to our accompanying financial statements.

We conduct annual assessments that review department goals to identify talent needs, assess how each division is positioned from a talent perspective, review the current state of talent vitality for each department, review key talent segments and prioritize actions to identify and develop talent. We periodically consider succession plans and focus on promoting internal talent to help grow our employees' careers. We encourage all employees to never stop learning through "Casa Systems University," an on-line platform offering our employees continued learning on various technology and business topics.

Our Corporate Information

We were incorporated in the State of Delaware on February 28, 2003. Our principal executive offices are located at 100 Old River Road, Andover, Massachusetts 01810, and our telephone number at that address is (978) 688-6706.

Available Information

We maintain an internet website at www.casa-systems.com and make available free of charge through our website our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports filed or furnished pursuant to Sections 13(a) and 15(d) of the Exchange Act of 1934, or the Exchange Act. We make these reports available through our website as soon as reasonably practicable after we electronically file such reports with, or furnish such reports to, the Securities and Exchange Commission, or the SEC. You can review our electronically filed reports and other information that we file with the SEC on the SEC's web site at http://www.sec.gov. We also make available, free of charge on our website, the reports filed with the SEC by our executive officers, directors and 10% stockholders pursuant to Section 16 under the Exchange Act as soon as reasonably practicable after copies of those filings are provided to us by those persons. In addition, we regularly use our website to post information regarding our business, product development programs and governance, and we encourage investors to use our website, particularly the information in the section entitled "Investor Relations," as a source of information about us.

The information on our website is not incorporated by reference into this Annual Report on Form 10-K and should not be considered to be a part of this Annual Report on Form 10-K. Our website address is included in this Annual Report on Form 10-K as an inactive technical reference only.

Item 1A. Risk Factors.

Our business is subject to numerous risks. The following important factors, among others, could cause our actual results to differ materially from those expressed in forward-looking statements made by us or on our behalf in this Annual Report on Form 10-K and other filings with the SEC, press releases, communications with investors, and oral statements. Actual future results may differ materially from those anticipated in our forward-looking statements. We undertake no obligation to update any forward-looking statements, whether as a result of new information, future events, or otherwise.

Risks Related to our Business

Risks Related to Our Financial Condition

If we are not able to refinance our Term Loan, we may not be able to generate enough cash flow to meet our debt obligations, causing substantial doubt about our ability to continue as a going concern.

Outstanding borrowings under our Term Loan were $226.0 million as of December 31, 2022, which matures on December 20, 2023. Because the Term Loan matures within one year and, as of the filing date of this report, the Company does not have committed financing or available liquidity to meet such debt obligations if they were to become due in accordance with their current terms, there is substantial doubt about our ability to continue as a going concern. We continue to work with potential lenders to refinance the existing debt and have engaged an advisory investment banking firm to assist us with this effort. Although management believes that we will be able to extend or refinance our debt prior to maturity, there can be no assurances regarding the ultimate success or timing of any modification to our Term Loan.

If our efforts to refinance the Term Loan are unsuccessful, we may be required to take alternative measures in order to raise sufficient cash to fully repay the outstanding debt balance and raise sufficient capital with which to continue operations, which may include actions such as raising capital via equity transactions, sale of significant assets, and significant cost reduction measures. Any of these measures may have an adverse impact on our ability to execute our business plan, take advantage of future opportunities, fund research and development initiatives, or respond to competitive pressures or unanticipated financial requirements. The ultimate success of any such actions in sustaining our ability to continue as a going concern cannot be assured, and no assurance can be given that such financing or asset sales will be available or, if available, that they will be on commercially favorable terms. Moreover, a favorable financing may be dilutive to investors.

We have outstanding debt that could limit our ability to make expenditures and investments in the conduct of our business and adversely impact our ability to obtain future financing.

As of December 31, 2022, we had $226.0 million of outstanding borrowings under our Term Loan, which matures on December 20, 2023. We may be unable to generate cash sufficient to pay when due the principal of, interest on, or other amounts due in respect of our indebtedness. We may be required to dedicate significant cash flows from operations to make such payments, which could limit our ability to make other expenditures and investments in the conduct of our business. Our indebtedness may also reduce our flexibility in planning for or reacting to changes in our business and market conditions. Our indebtedness also exposes us to interest rate risk, since our debt obligations generally bear interest at variable rates. In addition, we may incur additional indebtedness in the future to meet future financing needs. If we add new debt, the risks described above could increase.

Our credit facility contains restrictive and financial covenants that may limit our operating flexibility.

Our credit facility contains certain restrictive covenants that either limit our ability to, or require a mandatory prepayment in the event we incur additional indebtedness and liens, merge with other companies or consummate certain changes of control, acquire other companies, engage in new lines of business, change business locations, make certain investments, make any payments on any subordinated debt, transfer or dispose of assets, amend certain material agreements, and enter into various specified transactions. We, therefore, may not be able to engage in any of the foregoing transactions unless we obtain the consent of our lenders or prepay the outstanding amount under the credit facility. In addition to certain financial reporting requirements, the credit facility also contains a net leverage ratio covenant that may significantly reduce our available borrowings under such facilities.

Furthermore, our future working capital, borrowings or equity financing could be unavailable to repay or refinance the amounts outstanding under the credit facility. In the event of a liquidation, our lenders would be repaid all outstanding principal and interest prior to distribution of assets to unsecured creditors, and the holders of our common stock would receive a portion of any liquidation proceeds only if all of our creditors, including our lenders, were first repaid in full.

Risks Related to Our Market

Risks Related to Market Dynamics

We believe the CSP industry is in the early stages of a major architectural shift toward the virtualization of networks and the use of networks with distributed architectures. If the architectural shift does not occur, if it does not occur at the pace we predict, or if the products and services we have developed are not attractive to our customers after such shift takes place, our revenue could decline.

We believe the CSP industry is in the early stages of transitioning to the virtualization of networks and the use of networks with distributed architectures. We are developing products and services that we believe will be attractive to our customers and potential customers who make that shift. Our strategy depends in part on our belief that the industry shift to a software-centric cloud-based architecture and increasing densification will continue. In our experience, fundamental changes like this often take time to accelerate, and the adoption rates of our customers may vary. As our customers determine their future network architectures and how to implement them, we may encounter delayed timing of orders, deferred purchasing decisions and reduced expenditures. These longer decision cycles and reduced expenditures may negatively impact our revenue or make it difficult for us to accurately predict our revenue, either of which could materially adversely affect our business, financial condition, results of operations and prospects. Moreover, it is possible that our customers may reverse or fail to expand upon current trends toward virtualization and distributed architectures, which could result in significantly reduced demand for the products that we have developed and currently plan to develop.

If we do not successfully anticipate technological shifts, market needs and opportunities, and develop new products and product enhancements that meet those technological shifts, needs and opportunities, we may not be able to compete effectively.

The CSP market, including fixed-line broadband and wireless, is characterized by rapid technological shifts and increasingly complex customer requirements to achieve scalable networks that accommodate rapidly increasing consumer demand for bandwidth. To compete effectively, we must continue to develop new technologies and products that address emerging technological trends and changing customer needs. The process of developing new technology is complex and uncertain, and the development of new offerings requires significant upfront investment that may not result in material improvements to existing products or result in marketable new products or costs savings or revenue for an extended period of time, if at all.

We believe that our culture of innovation is a significant factor in our ability to develop new products. If we are not able to attract and retain employees that are able to contribute to our culture of innovation, our ability to identify emerging technological trends and changing customer needs and successfully develop new products to address them could be adversely impacted.

The success of new products and enhancements also depends on many other factors, including timely completion and introduction, differentiation from products offered by competitors and previous versions of our own products and, ultimately, market acceptance of these new products and enhancements. In addition, new technologies or standards could render our existing products obsolete or less attractive to customers. If we are unable to successfully introduce new products and enhancements, we would not be able to compete effectively and our business, financial condition, results of operations and prospects could be materially adversely affected.

Our success depends in large part on CSPs' continued deployment of, and investment in, ultra-broadband network capabilities and technologies that make use of our solutions.

Our solutions are dedicated to enabling cable, wireless and fixed-line broadband service providers to deliver voice, video and data services over newer and faster ultra-broadband networks. As a result, our success depends significantly on these service providers' continued deployment of, and investment in, their networks, which depends on a number of factors outside of our control. These factors include capital constraints, the presence of available capacity on legacy networks, perceived subscriber demand for ultra-broadband networks, competitive conditions within the CSP industry and regulatory issues. If CSPs do not continue deploying and investing in their ultra-broadband networks in ways that involve our solutions for these or other reasons, our business, financial condition, results of operations and prospects could be materially adversely affected.

Our continued growth depends on the pace and level of investment in 5G and 5G-related technologies.

We believe the CSP industry is in the early stages of a major architectural shift toward technologies and products related to 5G that include cloudification, virtualization, micro networks or network slicing, network densification, and 5G New Radio, or 5G NR, among others. We have invested heavily in products and solutions in these areas as we believe that they will represent significant future revenue and profitability for us. As 5G entails a fundamental shift in the way that wireless and fixed-line broadband markets are architected, the time required by our customers to evaluate and ultimately adopt 5G may be quite extended. If the adoption of 5G by our customers does not occur at the pace we predict, if our 5G products are not successful, or if our customers fail to make significant investments in 5G, our revenue could decline and our business, financial condition, results of operations, and prospects could be materially adversely impacted.

We have invested heavily in developing wireless and fixed-line broadband solutions, and we face risks in seeking to expand our platform into the wireless and fixed-line broadband markets.

We have invested heavily in developing wireless and fixed-line broadband solutions that are at an early stage of generating revenue. We cannot guarantee that these investments, or any of our other investments in research and development, will ever generate material revenue or become profitable for us, and the failure of these investments to generate positive returns may adversely impact our business, financial condition, results of operations and prospects. The wireless market makes up a substantial portion of our total potential addressable market. In addition, expanding our offerings into the wireless and fixed-line broadband markets presents other significant risks and uncertainties, including potential distraction of management from other business operations that generate more substantial revenue, the dedication of significant research and development, sales and marketing, and other resources to this new business line at the expense of our other business operations, and other risks that we may not have adequately anticipated.

Adverse economic conditions or reduced broadband infrastructure spending may adversely affect our business, financial condition, results of operations and prospects.

Our business depends on the overall demand for broadband connectivity. Weak domestic or global economic conditions, including fluctuating interest rates and inflation, fear or anticipation of such conditions or a reduction in broadband infrastructure spending even if economic conditions improve, could materially adversely affect our business, financial condition, results of operations and prospects in a number of ways, including longer sales cycles, lower prices for our products and services, reduced sales, and lower or no growth. Continued turmoil in the geopolitical environment in many parts of the world may also affect the overall demand for our products and services. Deterioration in global economic or political conditions could materially adversely affect our business, financial condition, results of operations and prospects in the future. A prolonged period of economic uncertainty or a downturn may also significantly affect the availability of capital and the terms and conditions of financing arrangements, including the overall cost of financing as well as the financial health or creditworthiness of our customers. Circumstances may arise in which we need, or desire, to raise additional capital, and such capital may not be available on commercially reasonable terms, or at all.

Regulations affecting broadband infrastructure could reduce demand for our products.

Laws and regulations governing the Internet and electronic commerce are emerging but remain largely unsettled, even in the areas where there has been some legislative action. Regulations may focus on, among other things, assessing access or settlement charges, or imposing tariffs or regulations based on the characteristics and quality of products, either of which could restrict our business or increase our cost of doing business. Government regulatory policies are likely to continue to have a major impact on the pricing of existing and new network services and, therefore, are expected to affect demand for those services and the communications products, including our products, supporting those services.

Any changes to existing laws or the adoption of new regulations by federal or state regulatory authorities or any legal challenges to existing laws or regulations affecting IP networks could materially adversely affect the market for our products. Moreover, customers may require us, or we may otherwise deem it necessary or advisable, to alter our products to address actual or anticipated changes in the regulatory environment. Our inability to alter our products or address any regulatory changes could have a material adverse effect on our consolidated financial position, results of operations or cash flows.

We face intense competition, including from larger, well-established companies, and we may lack sufficient financial or other resources to maintain or improve our competitive position.

The market for broadband infrastructure solutions is intensely competitive, and we expect competition to increase in the future from established competitors and new market entrants. This competition could result in increased pricing pressure, reduced profit margins, increased selling, general and administrative expenses, and loss of or stagnant market share, any of which could materially adversely affect our business, financial condition, results of operations and prospects.

In the CSP market, we primarily compete with larger and more established companies, such as Adtran, Cisco, CommScope, Ericsson, Huawei, Inseego, Nokia and Samsung, as well as a number of other suppliers of networking equipment and solutions to CSPs, such as Harmonic and Mavenir.

Many of our existing and potential competitors enjoy substantial competitive advantages, such as:

- greater name recognition and longer operating histories;
- larger sales and marketing budgets and resources;
- broader distribution and established relationships with customers;
- greater access to larger customer bases;
- greater customer support resources;
- greater manufacturing resources;
- the ability to leverage their sales efforts across a broader portfolio of products;
- the ability to leverage purchasing power with vendor subcomponents;
- the ability to incorporate additional functionality into their existing products;
- the ability to bundle offerings with other products and services;
- the ability to set more aggressive pricing policies;
- lower labor and development costs;
- greater resources to fund research and development or otherwise acquire new product offerings;
- larger intellectual property portfolios; and
- substantially greater financial, technical, research and development or other resources.

Our ability to compete will depend upon our ability to provide a comparable or better solution than our competitors at a price that offers superior value. We may be required to make substantial additional investments in research, development, sales and marketing in order to respond to our competition.

We also expect increased competition if our market continues to expand. Conditions in our market could change rapidly and significantly as a result of technological advancements or other factors. Current or potential competitors may be acquired by third parties that have greater resources available than we do. Our current or potential competitors might take advantage of the greater resources of the larger organizations resulting from these acquisitions to compete more vigorously or broadly with us. In addition, continued industry consolidation might adversely affect customers' perceptions of the viability of smaller and even medium-sized companies, such as us, and, consequently, customers' willingness to purchase from us. Further, certain large customers may develop broadband infrastructure solutions for internal use and/or to broaden their portfolios of internally developed resources, which could allow these customers to become new competitors in our market.

Risks Relating to Sales

Timing of large orders and seasonality in our revenue may cause our quarterly revenue and results of operations to fluctuate and possibly decline materially from quarter to quarter.

Our customers tend to make large perpetual license purchases from us when initiating or upgrading services based on our solutions, followed by smaller purchases for maintenance and ongoing support. In addition, for our cable products, purchases by existing customers of capacity expansions can also involve large individual orders that may represent a significant portion of our revenue for a fiscal quarter, which may also have a significant impact on our quarterly gross margin due to these capacity expansions generating higher gross margins than our initial hardware-based deployments. As a result of all of these factors, our quarterly revenue and results of operations, including our gross margin, may be significantly impacted by one or a small number of large individual orders. For example, any cancellation of orders or any acceleration or delay in anticipated product purchases or the acceptance of shipped products by a large customer could materially affect our revenue and results of operations in any quarterly period. We may be unable to sustain or increase our revenue from other new or existing customers to offset the discontinuation of purchases by one of our larger customers. As a result, our quarterly revenue and results of operations are difficult to estimate and may fluctuate or decline materially from quarter to quarter.

In addition, historically there have been significant seasonal factors which may cause revenue to be greater for the first and fourth quarters of our fiscal year as compared to the second and third quarters. We believe that this seasonality results from a number of factors, including the procurement, budgeting and deployment cycles of many of our customers. These seasonal variations may cause our quarterly revenue and results of operations to fluctuate or decline materially from quarter to quarter.

Our sales to the CSP market are volatile and our sales cycles can be long and unpredictable. As a result, our sales and revenue are difficult to predict and may vary substantially from period to period, which may cause our revenue and results of operations to fluctuate and possibly decline significantly.

Our sales to the CSP market have been characterized by large and sporadic purchases and long sales cycles. Sales activity often depends upon the stage of completion of expanding network infrastructures, the availability of funding and the extent to which CSPs are affected by regulatory, economic and business conditions in the countries in which they operate.

In addition, the timing of our sales and revenue recognition is difficult to forecast because of the unpredictability of our products' sales cycles. A sales cycle is the period between initial contact with a prospective customer and the sale of our products to that customer. Customer orders often involve the purchase of multiple products. These orders are complex and difficult to obtain because prospective customers generally consider a number of factors over an extended period of time before committing to purchase the products and solutions we sell. Customers, especially in the case of our large customers, often view the purchase of our products as a significant and strategic decision and require considerable time to evaluate, test and qualify our products prior to making a purchase decision and placing an order. The length of time that customers devote to their evaluation, contract negotiation and budgeting processes varies significantly, but can often exceed 24 months. During the sales cycle, we expend significant time and money on sales and marketing activities and make investments in evaluation equipment, all of which are included in our selling, general and administrative expenses and lower our operating margins, particularly if no sale occurs.

Even if a customer decides to purchase our products, there are many factors affecting the timing of our recognition of revenue, which makes our revenue difficult to forecast. For example, the sale of our products may be subject to acceptance testing or there may be unexpected delays in a customer's internal procurement processes, particularly for some of our larger customers, for whom our products represent a very small percentage of their total procurement activity. These factors may result in our inability to recognize revenue for months, or in some rare instances, for years following a sale. In addition, other factors that are specific to particular customers can affect the timing of their purchases and the variability of our revenue recognition, including the strategic importance of a particular project to a customer, budgetary constraints and changes in their personnel. For all of these reasons, it is difficult to predict whether a sale will be completed, the particular period in which a sale will be completed and the period in which revenue from a sale will be recognized. If our sales cycles lengthen, our revenue could be lower than expected, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

We are exposed to the credit risk of some of our customers and to credit exposures in the event of turmoil in the credit markets, which could result in material losses.

Due to our reliance on significant customers, we are dependent on the continued financial strength of these customers. If one or more of our significant customers experience financial difficulties, it could result in uncollectible accounts receivable and our loss of these customers and anticipated revenue.

The majority of our sales are on an open credit basis, with typical payment terms of 90 days or less. We monitor individual customer payment capability in granting such open credit arrangements, seeking to limit such open credit to amounts we believe our customers can pay and maintain reserves we believe are adequate to cover exposure for doubtful accounts. However, there can be no assurance that our open credit customers will pay the amounts they owe to us or that the reserves we maintain will be adequate to cover such credit exposure. Our customers' failure to pay and/or our failure to maintain sufficient reserves could have a material adverse effect on our consolidated financial statements. In addition, in the event that turmoil in the credit markets makes it more difficult for some customers to obtain financing, those customers' ability to pay could be adversely impacted, which in turn could have a material adverse impact on our business and operations.

A portion of our sales is also derived through our resellers, which tend to have more limited financial resources than other customers and to present increased credit risk. Our resellers also typically have the ability to terminate their agreements with us for any reason upon advance written notice.

Risks Relating to Concentration of Our Business

We expect certain of our customers will continue to represent a substantial portion of our revenue.

Historically, certain of our customers have accounted for a significant portion of our revenue. For example, sales to Bell Canada represented 13% of our revenue for the year ended December 31, 2022; sales to AT&T represented 22% and 11% of our revenue for the years ended December 31, 2021 and 2020, respectively; and sales to National Broadband Network represented 20% of our revenue for the year ended December 31, 2020. Based on their historical purchasing patterns, we expect that our large customers will continue to account for a substantial portion of our revenue in future periods. However, we are party to ordinary course agreements with most of our customers. These agreements generally do not include binding annual purchasing commitments, and actual purchases can vary significantly from year to year. The fact that a customer represents a significant percentage of revenue in any given year does not guarantee or imply that the same customer will represent a similar or greater percentage of revenue in any future year. Additionally, our customers generally make purchases from us on a purchase-order basis rather than pursuant to long-term contracts, and those that do enter long-term contracts typically have the right to terminate their contracts for convenience. As a result, we generally have no assurances that these large customers will continue to purchase our solutions. We may also see consolidation of our customer base, which could result in loss of customers. In addition, some of our large customers have used, and may in the future use, the sizes and relative importance of their orders to our business to require that we enter into agreements with more customer-favorable terms than we would otherwise agree to and obtain price concessions. The loss of a significant customer, a significant delay or reduction in purchases by large customers or significant price concessions to one or more large customers could have a material adverse effect on our business, financial condition, results of operations and prospects.

If we are unable to sell additional products to our existing customers, our revenue will be adversely affected.

To increase our revenue, we must sell additional products to our existing customers and add new customers. We expect that a substantial portion of our future sales will be follow-on sales to existing customers. For example, one of our sales strategies is to target sales of capacity expansions and implementation of wireless solutions at our current cable customers because they are familiar with the operational and economic benefits of our solutions. However, our existing customers may choose to use other providers for their infrastructure needs. If we fail to sell additional products to our existing customers, our business, financial condition, results of operations and prospects could be materially adversely affected.

We may have difficulty attracting new large customers or acquiring new customers due to the high costs of switching broadband equipment.

CSPs typically need to make substantial investments when deploying network infrastructure, which can delay a purchasing decision. Once a CSP has deployed infrastructure for a particular portion of its network, it is often difficult and costly to switch to another vendor’s infrastructure. Unless we are able to demonstrate that our products offer significant performance, functionality or cost advantages that outweigh a customer’s expense of switching from a competitor’s product, it will be difficult for us to generate sales once that competitor’s equipment has been deployed. Accordingly, if a customer has already deployed a competitor’s product for its broadband infrastructure, it may be difficult for us to sell our products to that customer. If we fail to attract new large customers or acquire new customers, our business, financial condition, results of operations and prospects could be materially adversely affected.

Our converged cable access platform, or CCAP, solutions currently represent a significant percentage of our product sales and there is an expected transition to virtualized CCAP solutions by our cable broadband customers; our business would be adversely affected in the event we are unable to sell one or more of our CCAP products due to this expected technology transition, or the move to virtualized CCAP solutions does not offset any declines in our CCAP product offerings.

Historically, we have generated the majority of our revenue from the cable market with our converged cable access platform, or CCAP. Since 2019, as we became more diversified via expansion of our target markets to include wireless and fixed-line broadband solutions, and following our acquisition of NetComm, the share of wireless and fixed-line broadband products in our revenue mix has increased. However, even as our business expands increasingly into wireless and fixed-line broadband solutions, we remain heavily dependent upon the sales of our CCAP solutions. In the event we are unable to market and sell these products or any future product that represents a substantial amount of our revenue, our business, financial condition, results of operations and prospects could be materially adversely affected.

Risks Related to Our International Dealings

We generate a significant amount of revenue from sales to customers outside of the United States and have increased geographic diversity of our revenues following the acquisition of NetComm; we are therefore subject to a number of risks associated with international sales and operations.

We have extensive international operations and generate a significant amount of revenue from sales to customers in Asia-Pacific, Europe and Latin America. Our ability to grow our business and our future success will depend to a significant extent on our ability to continue to expand our operations and customer base worldwide. To this end, in the third quarter of 2019, we completed the acquisition of NetComm, an Australian public company.

As a result of our international reach, we must hire and train experienced personnel to staff and manage our foreign operations. To the extent that we experience difficulties in recruiting, training, managing and retaining an international staff, and specifically staff related to sales management and sales personnel, we may experience difficulties in sales productivity in foreign markets. We also enter into strategic relationships with resellers and sales agents in certain international markets where we do not have a local presence. If we are not able to maintain these relationships or to recruit additional companies to enter into reseller and sales agent relationships, our future success in these international markets could be limited.

Business practices in the international markets that we serve may differ from those in the United States. and may require us in the future to include terms other than our standard terms in customer contracts. To the extent that we may enter into customer contracts in the future that include non-standard terms related to payment, warranties or performance obligations, our business, financial condition, results of operations and prospects could be materially adversely affected.

Our international sales and operations are subject to a number of risks, including the following:

- greater risk of unexpected changes in regulatory practices, tariffs and tax laws and treaties;
- greater difficulty in enforcing contracts and accounts receivable collection and longer collection periods;
- increased expenses incurred in establishing and maintaining our international operations;
- fluctuations in exchange rates between the U.S. dollar and foreign currencies where we do business;
- greater difficulty and costs in recruiting local experienced personnel;
- wage inflation in certain growing economies;
- general economic and political conditions in these foreign markets;
- economic uncertainty around the world as a result of sovereign debt issues;
- communication and integration problems resulting from cultural and geographic dispersion;
- limitations on our ability to access cash resources in our international operations;
- ability to establish necessary business relationships and to comply with local business requirements;
- risks associated with trade restrictions and foreign legal requirements, including the importation, certification and localization of our products required in foreign countries;
- the uncertainty of protection for intellectual property rights in some countries;
- delays resulting from our need to comply with foreign cybersecurity laws;
- greater risk of a failure of our operations and employees to comply with both U.S. and foreign laws and regulations, including antitrust regulations; the U.S. Foreign Corrupt Practices Act of 1977, as amended, or the FCPA; privacy and data protection laws and regulations and any trade regulations ensuring fair trade practices; and
- heightened risk of unfair or corrupt business practices in certain geographies and of improper or fraudulent sales arrangements that may impact financial results and result in restatements of, or irregularities in, financial statements.

These and other factors could harm our ability to gain future international revenue and, consequently, materially adversely affect our business, financial condition, results of operations and prospects. Expanding our existing international operations and entering into additional international markets will require significant management attention and financial commitments. Our failure to successfully manage our international operations and the associated risks effectively could limit our future growth or materially adversely affect our business, financial condition, results of operations and prospects.

We have significant operations in China, where many of the risks listed above are particularly acute. Import tariffs and other restrictions imposed by the United States government and related retaliatory action taken by China could significantly increase, among other things, which could cause an increase in the costs of raw materials, manufacturing of our products and costs for goods imported into the U.S., all of which could have a material adverse effect on our business and results of

operations. Any such trade barriers could reduce customer demand for our products if our customers have to pay increased prices for our products as a result of such policies. In addition, such policies may have a similar impact on other suppliers and certain customers, which could increase the negative impact on our operating results or future cash flows. Although we have not experienced a significant increase in the cost of our operations, if we were to do so, our products could become less competitive than those of our competitors whose imports are not subject to these trade policies.

We rely on resellers and sales agents to sell our products into certain international markets, and the loss of such resellers and sales agents could delay or harm our ability to deliver our products to our customers.

We rely upon resellers and sales agents to coordinate sales and distribution of our products in certain international markets. We provide our resellers and sales agents with specific training and programs to assist them in selling our products, but these steps may not be effective. In addition, our resellers and sales agents may be unsuccessful in marketing, selling and supporting our products and services. If we are unable to develop and maintain effective sales incentive programs for our resellers and sales agents, we may not be able to incentivize these resellers and sales agents to sell our products to customers. Any of our resellers and sales agents could elect to consolidate or enter into a strategic partnership with one of our competitors, which could reduce or eliminate our future opportunities with that reseller or sales agent. Our agreements with our resellers and sales agents may generally be terminated for any reason by either party with advance notice. We may be unable to retain these resellers and sales agents or secure additional or replacement resellers and sales agents. The replacement of one or more of our significant resellers or sales agents requires extensive training, and any new or expanded relationship with a reseller or sales agent may take several months or more to achieve productivity. Any of these events could materially adversely affect our business, financial condition, results of operations and prospects.

We are subject to governmental export and import controls and similar restrictions that could impair our ability to compete in international markets or subject us to liability if we violate them.

Our products may be subject to various export controls and because we incorporate encryption technology into certain of our products, certain of our products may be exported from various countries only with the required export license or through an export license exception. Furthermore, certain export control and economic sanctions laws prohibit the shipment of certain products, technology, software and services to embargoed countries and sanctioned governments, entities, and persons. If we fail to comply with the applicable export control laws, customs regulations, economic sanctions or other applicable laws, we could be subject to monetary damages or the imposition of restrictions which could materially adversely affect our business, financial condition, results of operations and prospects and could also harm our reputation. Further, there could be criminal penalties for knowing or willful violations, including incarceration for culpable employees and managers. Obtaining the necessary export license or other authorization for a particular sale may be time-consuming and may result in the delay or loss of sales opportunities.

In addition, various countries regulate the importation of certain encryption technology and products, including through import permit and license requirements, and have enacted laws that could limit our ability to distribute our products or could limit our customers' ability to implement our products in those countries. Any change in export or import regulations, economic sanctions or related legislation, shift in the enforcement or scope of existing regulations, or change in the countries, governments, persons or technologies targeted by such regulations could result in decreased use of our products by, or in our decreased ability to export or sell our products to, existing or potential customers with international operations or create delays in the introduction of our products into international markets. Any decreased use of our products or limitation on our ability to export or sell our products could materially adversely affect our business, financial condition, results of operations and prospects.

Risks Relating to Solutions

Risks Related to Quality

Our products are necessary for the operation of our customers' broadband service operations. Product quality problems, warranty claims, services disruptions, or other defects, errors or vulnerabilities in our products or services could harm our reputation and materially adversely affect our business, financial condition, results of operations and prospects.

We assist our customers in the operation of their broadband service operations. Failure of our products could result in significant interruptions in our customers' capabilities to maintain their networks and operations. Further, unsatisfactory performance could cause us to lose revenue or market share, increase our service costs, cause us to incur substantial costs in analyzing, correcting or redesigning our products, cause us to lose significant customers, subject us to liability for damages and

divert our resources from other tasks, any one of which could materially adversely affect our business, financial condition, results of operations and prospects.

In addition, sophisticated hardware and operating system software and applications that we produce or procure from third parties may contain defects in design or manufacture, including "bugs" and other problems that could unexpectedly interfere with the operation of our products. Such defects could result in warranty claims or claims by customers for losses that they sustain or, in some cases, could allow customers to claim damages. In the past, we have had to replace certain components of products that we had shipped or provide remediation in response to the discovery of defects or bugs from failures in software protocols.

Limitation of liability provisions in our standard terms and conditions of sale, and those of our resellers and sales agents, may not be enforceable under some circumstances or may not fully or effectively protect us from end-customer claims and related liabilities and costs. In some cases, including with respect to indemnification obligations under many of our agreements with customers and resellers, our contractual liability may be uncapped. The sale and support of our products also entail the risk of product liability claims. We maintain insurance to protect against certain types of claims associated with the use of our products, but our insurance coverage may not adequately cover any such claims. In addition, even claims that ultimately are unsuccessful could result in expenditures of funds in connection with litigation and divert management's time and other resources.

Our ability to sell our products is highly dependent on the quality of our support and services offerings, and our failure to offer high-quality support and services could have a material adverse effect on our business, financial condition, results of operations and prospects.

Once our products are deployed within our customers' networks, our customers depend on our support organization to resolve any issues relating to our products. Our provision of high-quality support is critical for the successful marketing and sale of our products. If we do not assist our customers in deploying our products effectively, do not succeed in helping our customers resolve post-deployment issues quickly or do not provide adequate ongoing support, it could adversely affect our ability to sell our products to existing customers and could harm our reputation with potential customers. In addition, our standard sales contracts require us to provide minimum service requirements to our customers on an ongoing basis and our failure to satisfy these requirements could expose us to claims under these contracts. Our failure to maintain high-quality support and services, including compliance with our contractual minimum service obligations, could have a material adverse effect on our business, financial condition, results of operations and prospects.

Risks Related to Research and Development

We may not generate positive returns on our research and development investments.

Developing our products is expensive, and the investment in product development may involve a long payback cycle or may result in investments in technologies or standards that do not get adopted in the timeframe we anticipate, or at all. For the years ended December 31, 2022, 2021 and 2020, our research and development expenses were $85.2 million, or approximately 29.7% of our revenue, $84.4 million, or approximately 21.0% of our revenue, and $84.4 million, or approximately 21.5% of our revenue, respectively. We expect to continue to invest in software and hardware development in order to expand the capabilities of our wireless and fixed-line broadband infrastructure solutions, introduce new products and features and build upon our technology leadership, and our research and development expenses may continue to increase in absolute dollars and as a percentage of revenue from 2022 to 2023. Our investments in research and development may not generate positive returns in a timely fashion or at all.

Our products must interoperate with operating systems, software applications and hardware, and comply with industry standards, that are developed by others, and if we are unable to devote the necessary resources for our products to interoperate with such software and hardware and comply with such standards, we may lose or fail to increase market share and experience a weakening demand for our products.

Generally, our products comprise only a part of and must interoperate with our customers' existing infrastructure, specifically their networks, servers, software and operating systems, which may be manufactured by a wide variety of vendors and original equipment manufacturers. Our products must also comply with industry standards, such as Data Over Cable Service Interface Specification, or DOCSIS, 3.0 and 3.1, and standards promulgated by the 3rd Generation Partnership Project, or 3GPP, a standards organization which develops protocols for mobile technology, which are established by third parties, in order to interoperate with such servers, storage, software and other networking equipment such that all systems function efficiently together. We may depend on other vendors to support prevailing industry standards. Also, some industry standards may not be widely adopted or implemented uniformly and competing standards and other approaches may emerge that may be preferred by our customers.

In addition, when new or updated versions of these industry standards, software systems or applications are introduced, we must sometimes develop updated versions of our software so that our products will interoperate properly. We may not accomplish these development efforts quickly, cost-effectively or at all. These development efforts require capital investment and the devotion of engineering resources. If we fail to maintain compatibility with these systems and applications, our customers may not be able to adequately utilize our products, and we may lose or fail to increase market share and experience a weakening in demand for our products, among other consequences, which could materially adversely affect our business, financial condition, results of operations and prospects.

Risks Related to Our Operations

Risks Related to Internal Resources

Our operations have experienced rapid growth in recent years, and if we do not appropriately manage any future growth or are unable to improve our systems and processes, our business, financial condition, results of operations and prospects will be adversely affected.

We have experienced rapid growth in the scope and complexity of our operations in recent years and are investing in growing our suite of solutions for cable, wireless and fixed-line broadband service providers. This has placed a strain on our management, administrative, operational and financial infrastructure. Our headcount increased from 743 as of December 31, 2018, to 1,043 as of December 31, 2022, and we anticipate continuing to increase our headcount as needed based on future growth. As we have grown, we have had to manage an increasingly larger and more complex array of internal systems and processes to scale with all aspects of our business, including our software development, contract manufacturing and purchasing, logistics and fulfillment and sales, maintenance and support. Our success will depend in part upon our ability to manage our growth effectively. To do so, we must continue to increase the productivity of our existing employees and continue to hire, train and manage new employees as needed. To manage domestic and international growth of our operations and personnel, we will need to continue to improve our operational, financial and management controls and our reporting processes and procedures and implement more extensive and integrated financial and business information systems. We may not be able to successfully implement these or other improvements to our systems and processes in an efficient or timely manner, and we may discover deficiencies in their capabilities or effectiveness. Our failure to improve our systems and processes, or their failure to operate effectively and in the intended manner, may result in disruption of our current operations and customer relationships, our inability to manage the growth of our business, and our inability to accurately forecast our revenue, expenses and earnings.

If we are unable to hire, retain, train and motivate qualified personnel and senior management, our business, financial condition, results of operations and prospects could be adversely affected.

Our future success depends, in part, on our ability to continue to attract and retain highly skilled personnel, particularly software engineering and sales personnel. Competition for highly skilled personnel is often intense, particularly in the greater Boston region where we are headquartered, and we may not be able to attract and retain the highly skilled employees that we need to support our business. Many of the companies with which we compete for experienced personnel have greater resources than we have to provide more attractive compensation packages and other amenities. Research and development personnel are aggressively recruited by startup and growth companies, which are especially active in many of the technical areas and geographic regions in which we conduct product development. In addition, in making employment decisions, particularly in the high-technology industry, job candidates often consider the value of the stock-based compensation they are to receive in connection with their employment. Declines in the market price of our stock could adversely affect our ability to attract, motivate or retain key employees. If we are unable to attract or retain qualified personnel, or if there are delays in hiring required personnel, our business, financial condition, results of operations and prospects could be materially adversely affected.

Also, to the extent we hire personnel from competitors, or from certain customers or other third parties whose employees we have agreed not to solicit, we may be subject to allegations that such personnel have been improperly solicited, that such personnel have divulged proprietary or other confidential information, or that former employers own certain inventions or other work product. Such claims could result in litigation.

Our future performance also depends on the continued services and continuing contributions of our senior management to execute our business plan and to identify and pursue new opportunities and product innovations. Our employment arrangements with our employees do not require that they continue to work for us for any specified period, and therefore, they could terminate their employment with us at any time. Further, the loss of members of our senior management team, sales and marketing team or engineering team, or any difficulty attracting or retaining other highly qualified personnel in the future, could significantly delay or prevent the achievement of our development and strategic objectives, which could materially

adversely affect our business, financial condition, results of operations and prospects. We do not maintain “key person” life insurance on our officers, directors or key employees.

If we do not effectively expand and train our direct sales force, we may be unable to increase sales to our existing customers or add new customers, and our business will be adversely affected.

We depend on our direct sales force to increase sales with existing customers and to obtain new customers. As such, we have invested and will continue to invest substantially in our sales organization. There is significant competition for sales personnel with the skills and technical knowledge that we require. Our ability to achieve significant revenue growth will depend, in large part, on our success in recruiting, training, retaining and integrating sufficient numbers of sales personnel to support our growth, particularly in international markets. In addition, we have increased the number of personnel in our sales and marketing departments over time, with headcount growing from 142 as of December 31, 2018, to 171 as of December 31, 2022. New hires require significant training and may take significant time before they achieve full productivity. Our recent hires and planned hires may not become productive as quickly as we expect, and we may be unable to hire, retain or integrate into our corporate culture sufficient numbers of qualified individuals in the markets where we do business or plan to do business. If we are unable to hire, integrate and train a sufficient number of effective sales personnel, or the sales personnel we hire are not successful in obtaining new customers or increasing sales to our existing customer base, our business, financial condition, results of operations and prospects could be materially adversely affected.

Risks Related to Supply Chain and Inventory Management

Because we depend on third-party manufacturers to build our hardware, we are susceptible to manufacturing delays and pricing fluctuations that could prevent us from delivering customer orders on time, if at all, or on a cost-effective basis, which may result in the loss of sales and customers.

We depend on third-party contract manufacturers to manufacture our product hardware. A significant portion of our cost of revenue consists of payments to these third-party contract manufacturers. Our reliance on these third-party contract manufacturers reduces our control over the manufacturing process, quality assurance, product costs and product supply and timing, which exposes us to risk. To the extent that our products are manufactured at facilities in foreign countries, we may be subject to additional risks associated with complying with local rules and regulations in those jurisdictions. If we are unable to manage our relationships with our third-party contract manufacturers effectively, or if these third-party manufacturers suffer delays or disruptions for any reason, experience increased manufacturing lead times, capacity constraints or quality control problems in their manufacturing operations or fail to meet our future requirements for timely delivery, our ability to ship products to our customers would be severely impaired, and our business, financial condition, results of operations and prospects could be materially adversely affected.

Our contract manufacturers typically fulfill our supply requirements on the basis of individual orders. We do not have long-term contracts with our third-party manufacturers that guarantee capacity, the continuation of particular pricing terms or the extension of credit limits. Accordingly, they are not obligated to continue to fulfill our supply requirements, which could result in supply shortages and increases in the prices for manufacturing services on short notice. We may not be able to develop alternative contract manufacturers in a timely manner, or at all. If we add or change contract manufacturers or change any manufacturing plant locations within a contract manufacturer network, we would add additional complexity and risk to our supply chain management.

In addition, we may be subject to significant challenges in ensuring that quality, processes and costs, among other issues, are consistent with our expectations and those of our customers. A new contract manufacturer or manufacturing location may not be able to scale its production of our products at the volumes or quality we require. This could also adversely affect our ability to meet our scheduled product deliveries to our customers, which could damage our customer relationships and cause the loss of sales to existing or potential customers, late delivery penalties, delayed revenue or an increase in our costs which could adversely affect our gross margins. This could also result in increased levels of inventory subjecting us to increased excess and obsolete charges that could have a negative impact on our results of operations.

Certain of our products are currently manufactured by a single contract manufacturer. While we believe there are other contract manufacturers with appropriate production capabilities, it would require significant time and resources before an alternative vendor could commence production of our products. Thus, should our current vendor experience a disruption in operation or other manufacturing issues, we could experience additional difficulty in filling customer orders for those products. This could materially, adversely impact our business, financial condition, results of operations and prospects.

Because some of the key components in our products come from limited sources of supply, we are susceptible to supply shortages or supply changes, which could disrupt or delay our scheduled product deliveries to our customers and may result in the loss of sales and customers.

Our products rely on key components that our contract manufacturers purchase on our behalf from a limited number of suppliers, including Altera, Analog Devices, Bell Power, Broadcom, Intel, Marvell, Maxim, Mini-Circuits, Qorvo, Qualcomm, Quectel, TTM Technologies and Xilinx. We do not have guaranteed supply contracts with any of our component suppliers, and our suppliers could delay shipments or cease manufacturing such products or selling them to us at any time. The development of alternate sources for those components is time-consuming, difficult and costly. If we are unable to obtain a sufficient quantity of these components on commercially reasonable terms or in a timely manner, sales of our products could be delayed or halted entirely, or we may be required to redesign our products. For example, as a result of COVID-19, certain of our components may be in short supply or may be delayed in reaching our contract manufacturers worldwide. These events could result in lost sales and damage to our customer relationships, which would adversely impact our business, financial condition, results of operations and prospects. In the event of a shortage or supply interruption from our component suppliers, we may not be able to develop alternate or secondary sources in a timely manner, on commercially reasonable terms or at all. In addition, certain of our customer contracts require us to notify our customers of any discontinuation of the products that we supply to them and to provide support for discontinued products, and lack of supply from our suppliers could leave us unable to fulfill our customer support obligations. Adverse changes to our relationships with our sole suppliers could result in lost sales and damage to our customer relationships, which would adversely impact our business, financial condition, results of operations and prospects.

We base our inventory requirements on our forecasts of future sales. If these forecasts are materially inaccurate, we may procure inventory that we may be unable to use in a timely manner or at all.

We and our contract manufacturers procure components and build our products based on our forecasts. These forecasts are based on estimates of future demand for our products, which are in turn based on historical trends and analyses from our sales and marketing organizations, adjusted for overall market conditions. To the extent our forecasts are materially inaccurate or if we otherwise do not need such inventory, we may under- or over-procure inventory, and such inaccuracies in our forecasts could subject us to contractual damages and otherwise materially adversely affect our business, financial condition, results of operations and prospects.

Risks Related to Information Technology Systems and Data Protection

Breaches of our cybersecurity systems and measures could degrade our ability to conduct our business operations and deliver products and services to our customers, delay our ability to recognize revenue, compromise the integrity of our products, result in significant data losses and the theft of our intellectual property, damage our reputation, expose us to liability to third parties and require us to incur significant additional costs to maintain the security of our networks and data.

We are increasingly dependent upon our IT systems to conduct virtually all of our business operations, ranging from our internal operations and product development activities to our marketing and sales efforts and communications with our customers and business partners. Certain persons and entities may attempt to penetrate our network and systems, or of the systems hosting our website, and may otherwise seek to misappropriate our proprietary or confidential information or cause interruptions of our service. Because the techniques used by such persons and entities to access or sabotage networks and systems change frequently and may not be recognized until launched against a target, we may be unable to anticipate these techniques. We have also outsourced a number of our business functions to third parties, including our manufacturers and logistics providers, and our business operations also depend, in part, on the success of these third parties' own cybersecurity measures. Additionally, we depend upon our employees and independent contractors to appropriately handle confidential data and deploy our IT resources in a safe and secure fashion that does not expose our network systems to security breaches and the loss of data. Accordingly, if any of our cybersecurity systems, processes or policies, or those of any of our manufacturers, logistics providers, customers or independent contractors, fail to protect against unauthorized access, sophisticated hacking or terrorism and the mishandling, misuse, or misappropriation of data by employees, contractors or other persons or entities, our ability to conduct our business effectively could be damaged in a number of ways, including:

- sensitive data regarding our business, including intellectual property, personal information and other confidential and proprietary data, could be leaked or stolen;
- our electronic communications systems, including email and other methods, could be disrupted, and our ability to conduct our business operations could be seriously damaged until such systems can be restored;
- our ability to process customer orders and electronically deliver products and services could be degraded, and our distribution channels could be disrupted, resulting in delays in revenue recognition, damage to our relationships with customers and prospective customers and damage to our reputation;
- defects and security vulnerabilities could be introduced into our software, products, network and systems, thereby damaging our reputation and perceived reliability and security of our products and potentially making the systems of our customers vulnerable to data loss and cyber incidents; and

- personally, identifiable data relating to various parties, including end users, employees and business partners could be compromised.

Should any of the above events occur, we could be subject to significant claims for liability from our customers, employees or others and regulatory investigations or actions from governmental agencies. In addition, our ability to protect our intellectual property rights could be compromised and our reputation and competitive position could be significantly harmed. Any regulatory, contractual or other actions, litigation, investigations, fines, penalties and liabilities relating to any actual or alleged misuse or misappropriation of personal data or other confidential or proprietary information could be significant in terms of monetary exposure and reputational impact and necessitate changes to our business operations that may be disruptive to us. Additionally, we could incur significant costs in order to upgrade our cybersecurity systems, processes, policies and procedures and remediate damages. Consequently, our financial performance and results of operations could be materially adversely affected.

Risks Related to Acquisitions

We may invest in or acquire other businesses, which could require significant management attention, disrupt our business, dilute stockholder value and adversely affect our business, financial condition, results of operations and prospects.

As part of our growth strategy, we may make investments in or acquire complementary companies, products or technologies. We do not have significant experience in making investments in other companies nor have we made a significant number of acquisitions to date, and as a result, our ability as an organization to evaluate and/or complete investments or acquire and integrate other companies, products or technologies in a successful manner is unproven. We may not be able to find suitable future investment or acquisition candidates, and we may not be able to complete such investments or acquisitions on favorable terms, if at all. Our acquisition of a target company, including our acquisition of NetComm, may not achieve the objectives we have outlined for our stockholders or strengthen our competitive position. Our past acquisitions, such as NetComm, or any investments or acquisitions we complete in the future, may not ultimately strengthen our competitive position or achieve our goals, and such investments or acquisitions could be viewed negatively by our customers, investors and securities analysts.

In addition, current and future investments and acquisitions may result in unforeseen operating difficulties and expenditures. For example, if we are unsuccessful at integrating any acquisitions or retaining key talent from those acquisitions, or the technologies associated with such acquisitions, into our company, the business, financial condition, results of operations and prospects of the combined company could be materially adversely affected. Any integration process may require significant time and resources, and we may not be able to manage the process successfully. We may not successfully evaluate or utilize the acquired technology or personnel or accurately forecast the financial effects of an acquisition transaction, including accounting charges. We may have to pay cash, incur debt or issue equity securities to pay for any such investment or acquisition, each of which could adversely affect our financial condition or the market price of our common stock. The sale of equity or issuance of convertible debt to finance any such acquisitions could result in dilution to our stockholders. The incurrence of indebtedness would result in increased fixed obligations and could also include covenants or other restrictions that would impede our ability to manage our operations. Moreover, if the investment or acquisition becomes impaired, we may be required to take an impairment charge, which could adversely affect our financial condition or the market price of our common stock.

Risks Related to Litigation

Litigation could distract management, increase our expenses or subject us to material money damages and other remedies.

We have been and may in the future be involved from time to time in various legal proceedings, including, but not limited to, actions relating to breach of contract or intellectual property infringement that might necessitate changes to our business or operations. Regardless of whether any claims against us have merit, or whether we are ultimately held liable or subject to payment of damages, claims may be expensive to defend and may divert management's time away from our operations. If any legal proceedings were to result in an unfavorable outcome, it could have a material adverse effect on our business, financial position and results of operations. Any adverse publicity resulting from actual or potential litigation may also materially and adversely affect our reputation, which in turn could adversely affect our results.

Risks Related to COVID-19 Pandemic

We may continue to experience the negative effects of the COVID-19 pandemic on our supply chain, which has had, and may continue to have, an adverse effect on our revenue and results of operations.

The effects of the COVID-19 pandemic caused disruptions in our global supply chain, and may continue to do so in the future. Throughout 2022 and 2021, we experienced shipping bottlenecks and shortages of supply that resulted in our inability to fulfill certain customer orders within normal lead times. This adversely impacted our revenue and operating results for the years ended December 31, 2022 and 2021. We have also seen, in some cases, significant increases in shipping costs. While we continue to work with our supply chain, contract manufacturers, logistics partners and customers to minimize the extent of such impacts, we expect the effects of global supply chain issues to continue and cannot predict if or when such effects will subside. This may prevent us from being able to fulfill our customers' orders in a timely manner or at all, which could lead to one or more of our customers canceling their orders. At this time, we are neither able to estimate the extent of these impacts nor predict whether our efforts to minimize or contain them will be successful.

To the extent the COVID-19 pandemic created externalities that benefited our business, we expect that those externalities will not endure.

In addition to the negative impact on our business from global supply chain challenges related to COVID-19, we derived certain benefits that decreased certain operating expenses, such as travel and trade show expense. We also benefited from certain U.S. government tax relief measures, during the years ended December 31, 2022, 2021 and 2020. These benefits began to gradually diminish throughout 2022 and may continue to do so as the various geographies in which we operate continue to recover from the pandemic and we resume our typical travel and trade show activities and government tax relief measures lapse.

Recent years' financial results may not be indicative of future results due to the disruptions to our business caused by the COVID-19 pandemic.

Due to the impacts from the COVID-19 pandemic and as described generally in this Annual Report on Form 10-K, and above, our results of operations for the years ended December 31, 2022, 2021, and 2020, are not necessarily indicative of the results to be expected in future periods. For example, increased demand for residential broadband services contributed to our strong revenue performance in 2020 and 2021. However, we cannot guarantee that such increased demand will continue in the future, or that such increased demand will lead to increased revenues for us. Additionally, predictions and estimates for future periods are necessarily uncertain given potential lingering effects of the pandemic, particularly with respect to our supply chain challenges, which could become exacerbated in the event of a resurgence of COVID-19. If supply chain disruptions or other negative impacts of the pandemic continue into the future, there would likely be a material adverse impact on our financial results and results of operations.

Risks Related to Inflation

Rising inflation rates could negatively impact our revenue and profitability if increases in the prices of our products and services or a decrease in customer spending results in lower sales. If we are not able to pass cost increases on to our customers, our gross margin and net income would be adversely affected, and the adverse impact may be material. In addition, rising inflation rates have resulted in a significant increase in interest rates, which will also have an adverse impact on our financial results.

Recent significant increases in inflation rates may result in decreased demand for our products and services, increased manufacturing and operating costs (including our labor costs), reduced liquidity, and limitations on our ability to access credit or otherwise raise debt and equity capital. In an inflationary environment, because certain of our customer contracts provide for fixed pricing and/or due to our competitor's pricing strategies, we may be unable to raise the sales prices of our products and services at or above the rate at which our costs increase, which would reduce our profit and operating margins and could have a material adverse effect on our financial results. We also may experience lower than expected sales and potential adverse impacts on our competitive position if there is a decrease in customer spending or a negative reaction to any price increases we are able to implement. A reduction in our revenue would be detrimental to our profitability and financial condition and could also have an adverse impact on our future growth. In addition, the U.S. Federal Reserve has raised, and may continue to raise,

interest rates in response to concerns about inflation. We have significant outstanding debt that carries interest at variable rates, and thus, increases in interest rates have a material adverse impact on our profitability.

Risks Related to Intellectual Property

Risks Related to Our Intellectual Property

If we are unable to obtain, maintain or protect our intellectual property rights, our competitive position could be harmed or we could be required to incur significant expenses to enforce our rights.

Our success depends, in part, on our ability to protect our proprietary technology. We rely on trade secret, patent, copyright and trademark laws and confidentiality agreements with employees and third parties to protect and enforce our rights to our proprietary technology, all of which offer only limited protection.

We have a relatively limited patent portfolio. With respect to the protection of our technology and inventions, we rely to a significant degree on trade secrets. If others independently discover our trade secrets, we would not be able to assert trade secret rights against such parties. Effective trade secret protection may not be available in every country in which our services are available or where we have employees or independent contractors. The loss or unavailability of trade secret protection could make it easier for third parties to compete with our products by copying functionality. In addition, any changes in, or unexpected interpretations of, the trade secret and employment laws in any jurisdiction in which we operate may compromise our ability to enforce our intellectual property rights. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position.

To protect our trade secrets and other proprietary information, we rely in significant part on confidentiality arrangements with our employees, licensees, independent contractors, advisers and customers. These arrangements may not be effective to prevent disclosure of proprietary information, including trade secrets, and may not provide an adequate remedy in the event of unauthorized disclosure of proprietary information.

We rely on patents to protect certain aspects of our proprietary technology in the United States and other jurisdictions. The process of obtaining patent protection is expensive and time-consuming, and we may not be able to prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. We may choose not to seek patent protection for certain innovations and may choose not to pursue patent protection in certain jurisdictions. Further, we cannot guarantee that any of our pending patent applications will result in the issuance of patents or that any patents that do issue from such applications will have adequate scope to provide us with a competitive advantage. There is no assurance that all potentially relevant prior art relating to our patents and patent applications has been found. To the extent that additional patents are issued from our patent applications, which is not certain, third parties may challenge their validity, enforceability or scope, which may result in such patents being narrowed or invalidated. If third parties have prepared and filed patent applications in the United States that also claim technology to which we have rights, we may have to participate in interference proceedings in the United States Patent and Trademark Office to determine priority of invention for patent applications filed before March 16, 2013, or in derivation proceedings to determine inventorship for patent applications filed after such date. In addition, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after its effective filing date. Even if patents covering our products are obtained by us or by our licensors, once such patents expire, we may be vulnerable to competition from similar products. Moreover, the rights granted under any issued patents may not provide us with adequate protection or competitive advantages, and, as with any technology, competitors may be able to develop similar or superior technologies to our own now or in the future.

Despite our efforts, the steps we have taken to protect our proprietary rights may not be adequate to preclude misappropriation of our proprietary information or infringement of our intellectual property rights, and our ability to police such misappropriation or infringement is uncertain, particularly in countries outside of the United States. Competitors may use our technologies in jurisdictions where we have not obtained or are unable to adequately enforce intellectual property protection to develop their own products. We are also restricted from asserting our intellectual property rights against certain customers under our contracts with them.

Detecting and protecting against the unauthorized use of our products, technology and proprietary rights is expensive, difficult and, in some cases, impossible. Litigation may be necessary in the future to enforce or defend our intellectual property rights, to protect our trade secrets or to determine the validity and scope of the proprietary rights of others. Such litigation could

result in substantial costs and diversion of management resources, either of which could materially adversely affect our business, financial condition, results of operations and prospects, and there is no guarantee that we would be successful. Furthermore, many of our current and potential competitors have the ability to dedicate substantially greater resources to protecting their technology or intellectual property rights than we do. Accordingly, despite our efforts, we may not be able to prevent third parties from infringing upon or misappropriating our intellectual property, which could result in a substantial loss of our market share. Even if we did succeed in enforcing our intellectual property through litigation, this may be costly and divert management resources.

Finally, certain of our license agreements with our third-party licensors provide for joint ownership of developments or inventions that we create that are related to the subject matter of the license. Other agreements to which we are subject, including member agreements with standards bodies and research and development consortia, may require us to disclose and/or grant licenses to technology that is related to the subject matter of the standards body or the consortium and included in our contributions to specifications established by these bodies. These agreements could result in third parties having ownership or license rights to important intellectual property with respect to which we otherwise may have elected to maintain exclusive ownership.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

We have not applied for trademark registration for our name and logo in all geographic markets. In those markets where we have applied for trademark registration, failure to secure those registrations could adversely affect our ability to enforce and defend our trademark rights and result in indemnification claims. Our registered or unregistered trademarks or trade names, as well as the registered or unregistered trademarks or trade names used by our resellers or distributors associated with our products, may be challenged, infringed, circumvented or declared generic or determined to be infringing on other marks. Any claim of infringement by a third party, even those claims without merit, could cause us to incur substantial costs defending against such claim, could divert management attention from our business and could require us to cease use of such intellectual property in certain geographic markets. Over the long term, if we, or our resellers or distributors, are unable to establish name recognition based on our trademarks and trade names, then our business may be adversely affected.

Risks Related to Third-Party Intellectual Property

Unavailability, termination or breach of licenses to third-party software and other intellectual property could materially harm our business.

Many of our products and services include software or other intellectual property licensed from third parties, and we otherwise use software and other intellectual property licensed from third parties in our business. We exercise no control over our third-party licensors, and the failure or unsuitability of their software or other intellectual property exposes us to risks that we will have little ability to control. For example, a licensor may have difficulties keeping up with technological changes or may stop supporting the software or other intellectual property that it licenses to us; our licensors may also have the ability to terminate our licenses if the licensed technology becomes the subject of a claim of intellectual property infringement. Also, it will be necessary in the future to renew licenses, expand the scope of existing licenses or seek new licenses, relating to various aspects of these products and services or otherwise relating to our business, which may result in increased license fees. Any new licenses may not be available on acceptable terms, if at all. In addition, a third party may assert that we or our customers are in breach of the terms of a license, which could, among other things, give such third party the right to terminate a license or seek damages from us, or both. The inability to obtain or maintain certain licenses or other rights or to obtain or maintain such licenses or rights on favorable terms, or the need to engage in litigation regarding these matters, could result in delays in releases of products and services and could otherwise disrupt our business, until equivalent technology can be identified, licensed or developed, if at all, and integrated into our products and services or otherwise in the conduct of our business. Moreover, the inclusion in our products and services of software or other intellectual property licensed from third parties on a nonexclusive basis may limit our ability to differentiate our products from those of our competitors. Any of these events could have a material adverse effect on our business, financial condition, results of operations and prospects.

Our products contain third-party open source software components, and failure to comply with the terms of the underlying open source software licenses could restrict our ability to sell our products.

Our products contain software modules licensed to us by third parties under “open source” licenses. Use and distribution of open source software may entail greater risks than use of third-party commercial software, as open source licensors generally do not provide warranties or other contractual protections regarding infringement claims or the quality of the code. Some open

source licenses contain requirements that we make available source code for modifications or derivative works we create based upon the type of open source software that we use. If we combine our software with open source software in a certain manner, we could, under certain open source licenses, be required to release portions of the source code of our software to the public. This would allow our competitors to create similar products with lower development effort and time and ultimately could result in a loss of product sales for us.

Although we monitor our use of open source software to avoid subjecting our products to undesirable conditions, we do not have a formal open source policy in place that gives our developers written guidance on what open source licenses we deem "safe." Further, even where we believe an open source license may have acceptable conditions, the terms of many open source licenses have not been interpreted by U.S. courts, and these licenses could be construed in a way that could impose unanticipated conditions or restrictions on our ability to commercialize our products. Moreover, we cannot guarantee that our informal processes for controlling our use of open source software in our products will be effective or that our compliance with open source licenses, including notice and attribution requirements, are adequate. If we are held to have breached the terms of an open source software license, we could be required to seek licenses, which may not be available on economically feasible terms, from third parties to continue offering our products, to re-engineer our products, to discontinue the sale of our products if re-engineering could not be accomplished on a timely or commercially reasonable basis, or to make generally available, in source code form, our proprietary code. We also could face infringement claims. Any of the foregoing could materially adversely affect our business, financial condition, results of operations and prospects.

Risks Related to Intellectual Property Litigation

Assertions by third parties of infringement or other violations by us of their intellectual property rights, or other lawsuits asserted against us, could result in significant costs and materially adversely affect our business, financial condition, results of operations and prospects.

Patent and other intellectual property disputes are common in the broadband industry and have resulted in protracted and expensive litigation for many companies. Many companies in the broadband industry, including our competitors and other third parties, as well as non-practicing entities, own large numbers of patents, copyrights, trademarks and trade secrets, which they may use to assert claims of patent infringement, misappropriation or other violations of intellectual property rights against us. As discussed in greater detail below, from time to time, they have or may in the future also assert such claims against our customers or certain of our business partners whom we typically indemnify against claims that our products infringe, misappropriate or otherwise violate the intellectual property rights of third parties.

As the number of products and competitors in our market increases and overlaps occur, claims of infringement, misappropriation and other violations of intellectual property rights may increase. Any claim of infringement, misappropriation or other violations of intellectual property rights by a third party, even those without merit, could cause us to incur substantial costs defending against the claim, distract our management from our business and require us to cease use of such intellectual property, which may impact important elements of our business. In addition, some claims for patent infringement may relate to subcomponents that we purchase from third parties. If these third parties are unable or unwilling to indemnify us for these claims, we could be substantially harmed.

The patent portfolios of most of our competitors are larger than ours. This disparity may increase the risk that our competitors may sue us for patent infringement and may limit our ability to counterclaim for patent infringement or settle through patent cross-licenses. In addition, future assertions of patent rights by third parties, and any resulting litigation, may involve patent holding companies or other adverse patent owners who have no relevant product revenue and against whom our own patents may therefore provide little or no deterrence or protection. We cannot guarantee that we are not infringing or otherwise violating any third-party intellectual property rights.

The third-party asserters of intellectual property claims may be unreasonable in their demands, or may simply refuse to settle, which could lead to expensive settlement payments, prolonged periods of litigation and related expenses, additional burdens on employees or other resources, distraction from our business, supply stoppages and lost sales. Moreover, in recent years, individuals and groups that are non-practicing entities, commonly referred to as "patent trolls," have purchased patents and other intellectual property assets for the purpose of making claims of infringement in order to extract settlements. From time to time, we receive threatening letters or notices and have been the subject of claims that our solutions and underlying technology infringe or violate the intellectual property rights of others. Responding to such claims, regardless of their merit, can be time-consuming, costly to defend in litigation, divert management's attention and resources, damage our reputation and brand, and cause us to incur significant expenses.

An adverse outcome of a dispute may require us to pay substantial damages including treble damages if we are found to have willfully infringed a third party's patents; cease making, licensing or using solutions that are alleged to infringe or misappropriate the intellectual property of others; expend additional development resources to attempt to redesign our products or services or otherwise to develop non-infringing technology, which may not be successful; enter into potentially unfavorable royalty or license agreements in order to obtain the right to use necessary technologies or intellectual property rights; and indemnify our partners and other third parties. Any damages or royalty obligations we may become subject to as a result of an adverse outcome, and any third-party indemnity we may need to provide, could materially adversely affect our business, financial condition, results of operations and prospects. Royalty or licensing agreements, if required or desirable, may be unavailable on terms acceptable to us, or at all, and may require significant royalty payments and other expenditures. Further, there is little or no information publicly available concerning market or fair values for license fees, which can lead to overpayment of license or settlement fees. In addition, some licenses may be non-exclusive, and therefore our competitors may have access to the same technology licensed to us. Suppliers subject to third-party intellectual property claims also may choose or be forced to discontinue or alter their arrangements with us, with little or no advance notice to us. Any of these events could materially adversely affect our business, financial condition, results of operations and prospects.

Our indemnification obligations to our customers and business partners for claims of intellectual property infringement or misappropriation are relatively broad in scope and could result in significant liability for us.

Our agreements with our customers and certain of our business partners typically include broad intellectual property indemnification provisions pursuant to which we may be required to indemnify and hold harmless our customers and partners for all damages, costs, expenses, liabilities, and settlements (including court costs and attorney fees) arising out of any claim, cause of action, demand, lawsuit or other action alleging that the customer or partner's use, operation or resale of our products infringes a third party's intellectual property rights or misappropriates a third party's trade secrets. We do not necessarily have the right to assume the defense of such claims in all instances, and in some cases, we may have such right, but we may decline to take advantage of it. To the extent they control the defense of any such claim, our customers and partners may select legal counsel, agree to legal fee arrangements, or pursue legal strategies that we would not select. In some instances, our customers or partners may be able to settle claims without our consent despite our obligation to contribute in part or in full to any settlement. The resolution of any such claim may require us to procure for our customers or partners the right to continue using the solution in controversy or modifying the solution so that it becomes non-infringing or no longer constitutes a misappropriation. If neither of those options is feasible, we could be required in some instances to refund, in full or in part, the license fee or the purchase price paid in connection with the solution in controversy. For all of these reasons, our potential liability with respect to any demand for indemnification, even if the claim of infringement or misappropriation ultimately fails, could be substantial and could materially adversely affect our business, financial condition, results of operations and prospects.

Plaintiffs bringing intellectual property infringement and misappropriation claims often will target defendants perceived to have the deepest pockets. Our customers and certain of our business partners are often significantly larger than we are. As a result, plaintiffs may target our customers and business partners (as opposed to targeting us) for claims alleging infringement or misappropriation by our solutions. We have in the past, and expect that we will continue in the future, to receive demands for intellectual property indemnification from our customers and partners. While the liability we have incurred to date has not been material in any single case or in the aggregate, we cannot guarantee that in the future we will not incur a material liability under our indemnification obligations. Such a liability, were it to occur, could materially adversely affect our business, financial condition, results of operations and prospects.

Risks Related to Our Common Stock

Risks Related to Investment in Our Common Stock

Our results of operations are likely to vary significantly from period to period and be unpredictable. If we fail to meet the expectations of analysts or investors, the market price of our common stock could decline substantially.

Our results of operations have historically varied significantly from period to period, and we expect that this trend will continue. As a result, you should not rely upon our past financial results for any period as indicators of future performance. Our results of operations in any given period can be influenced by a number of factors, many of which are outside of our control and may be difficult to predict, including the factors described above, as well as:

- changes in our pricing, whether initiated by us or as a result of competition;

- changes in our product mix, which may vary from period to period and negatively affect our gross margin and overall profitability;
- the amount and timing of operating costs and capital expenditures related to the operation and expansion of our business;
- changes in the growth rate of the broadband services market or changes in demand for broadband services from our customers' subscribers, which could impact the level of demand for our products;
- lengthy product testing or certification processes by our customers of our products, which could significantly delay our ability to recognize revenue;
- the actual or rumored timing and success of new product and service introductions by us or our competitors or any other change in the competitive landscape of our industry, including consolidation among our competitors or customers;
- our ability to successfully expand our business geographically;
- insolvency or credit difficulties confronting our customers, which could adversely affect their ability to purchase or pay for our products and services, or confronting our key suppliers, including our sole source suppliers, which could disrupt our supply chain;
- our inability to fulfill our customers' orders due to supply chain delays, access to key commodities or technologies or events that impact our manufacturers or their suppliers;
- the costs and possible outcomes of any contingent liabilities, as well as legal actions or proceedings against us, including those described under "Part I, Item 3 – Legal Proceedings";
- our overall effective tax rate, including impacts caused by the relative proportion of foreign to U.S. income, the amount and timing of certain employee stock-based compensation transactions, changes in the valuation of our deferred tax assets and any new legislation or regulatory developments;
- increases or decreases in our expenses caused by fluctuations in foreign currency exchange rates;
- increases or decreases in our expenses caused by fluctuations in interest rates;
- global impacts of inflation and actions taken by central banks to counter inflation; and
- general economic conditions, both domestically and in foreign markets, including macro-economic recession concerns, a potential economic downturn, or inflationary conditions.

Any one of the factors above or the cumulative effect of several of the factors described above may result in significant fluctuations in our financial and other results of operations. This variability and unpredictability could result in our failure to meet expectations of securities analysts or investors for a particular period. If we fail to meet or exceed such expectations for these or any other reasons, the market price of our common stock could decline substantially, and we could face costly lawsuits, including securities class action suits, such as those described in "Part I, Item 3 – Legal Proceedings."

The market price of our common stock has been volatile in the past and may be volatile in the future, which could result in substantial losses for investors.

The market price of our common stock has endured significant and swift increases and declines in the time since trading in the stock on the Nasdaq Global Select Market began on December 15, 2017. The market price of our common stock could be subject to similar significant fluctuations in the future. Some of the factors that may cause the market price of our common stock to fluctuate include:

- actual or anticipated changes in our earnings or fluctuations in our results of operations or in the expectations of securities analysts;
- price and volume fluctuations in the overall stock market from time to time;
- volatility in the market price and trading volume of comparable companies;
- announcements of technological innovations, new products, strategic alliances, or significant agreements by us or by our competitors;
- announcements by our customers regarding significant increases or decreases in capital expenditures;

- departure of key personnel;
- litigation involving us or that may be perceived as having an impact on our business;
- changes in general economic, industry and market conditions and trends;
- investors’ general perception of us;
- the costs and possible outcomes of any contingent liabilities, as well as legal actions or proceedings against us, including those described under “Part I, Item 3 – Legal Proceedings”;
- sales of large blocks of our stock; and
- announcements regarding further industry consolidation.

We and certain of our current and former executive officers and current and former members of our board of directors have in the past been named as defendants in putative class action lawsuits relating to past decreases in the market price of our common stock. Because of the potential volatility of our stock price, we may become the target of additional securities litigation in the future. Securities litigation could result in substantial costs and divert management’s attention and resources from our business.

We have broad discretion in the use of our cash reserves and may not use them effectively.

Subject to restrictions in the agreements governing our indebtedness, our management has broad discretion to use our cash reserves and could use our cash reserves in ways that do not improve our results of operations or enhance the value of our common stock. The failure by our management to apply these funds effectively could adversely affect our ability to operate and grow our business. Pending their use, we may invest our cash reserves in a manner that does not produce income or that loses value.

Because we do not expect to declare any dividends on our common stock for the foreseeable future, investors in our common stock may never receive a return on their investment.

Although we declared special dividends on five occasions prior to our initial public offering, we do not anticipate that we will declare any cash dividends to holders of our common stock in the foreseeable future, and investors should not rely on an investment in our common stock to provide dividend income. Instead, we plan to retain any earnings to maintain and expand our existing operations. Accordingly, investors must rely on sales of their common stock after price appreciation, which may never occur, as the only way to realize any return on their investment. As a result, investors seeking cash dividends should not purchase our common stock.

Any future determination to declare dividends will be made at the discretion of our board of directors and will depend on a number of factors, including future earnings, capital requirements, financial conditions, future prospects, contractual restrictions and covenants, and other factors that our board of directors may deem relevant. Our credit facility contains covenants that limit our ability to pay dividends on our capital stock.

Insiders have substantial control over us, which could limit your ability to influence the outcome of key transactions, including a change of control.

As of January 31, 2023, our directors, executive officers and 10% stockholders beneficially owned, in the aggregate, approximately 57.2% of our outstanding common stock. As a result, these stockholders could have significant influence over the outcome of matters submitted to our stockholders for approval, including the election of directors and any merger, consolidation or sale of all or substantially all of our assets, and over the management and affairs of our company. This concentration of ownership may have the effect of delaying or preventing a change in control of our company and might affect the market price of our common stock.

A significant portion of our total outstanding shares may be sold into the public market at any time, which could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a significant number of shares of our common stock in the public market could occur at any time. These sales, or the market perception that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock.

In addition to our outstanding common stock, as of January 31, 2023, there were 6,498,727 shares subject to outstanding options, 4,275,098 shares subject to outstanding restricted stock unit awards, or RSUs, 906,894 shares subject to outstanding performance-based restricted stock units, or PSUs, and an additional 6,642,502 shares reserved for future issuance under our equity incentive plans. Because we have registered all shares of common stock that may be issued under our equity incentive plans pursuant to a Registration Statement on Form S-8, any such registered shares that we issue can be freely sold in the public market upon issuance, subject to the restrictions imposed on our affiliates under Rule 144.

Risks Related to Our Charter and Bylaws

Anti-takeover provisions in our restated certificate of incorporation and our amended and restated bylaws, as well as provisions of Delaware law, might discourage, delay or prevent a change in control of our company or changes in our management and, therefore, depress the trading price of our common stock.

Our restated certificate of incorporation, our amended and restated bylaws, and Delaware law contain provisions that may discourage, delay or prevent a merger, acquisition or other change in control that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares of our common stock. These provisions may also prevent or delay attempts by our stockholders to replace or remove our management. Our corporate governance documents include provisions:

- establishing a classified board of directors with staggered three-year terms so that not all members of our board are elected at one time;
- providing that directors may be removed by stockholders only for cause and only with a vote of the holders of at least 75% of the issued and outstanding shares of common stock;
- limiting the ability of our stockholders to call and bring business before special meetings and to take action by written consent in lieu of a meeting;
- requiring advance notice of stockholder proposals for business to be conducted at meetings of our stockholders and for nominations of candidates for election to our board of directors;
- authorizing blank check preferred stock, which could be issued with voting, liquidation, dividend and other rights superior to our common stock; and
- limiting the liability of, and providing indemnification to, our directors and officers.

As a Delaware corporation, we are also subject to provisions of Delaware law, including Section 203 of the Delaware General Corporation Law, which limits the ability of stockholders holding more than 15% of our outstanding common stock from engaging in certain business combinations with us. Any provision of our restated certificate of incorporation or amended and restated bylaws or Delaware law that has the effect of delaying or deterring a change in control could deter potential acquirers of our company, could therefore limit the opportunity for our stockholders to receive a premium for their shares of our common stock in an acquisition, and could also affect the price that some investors are willing to pay for our common stock.

Our restated certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the exclusive forum for substantially all disputes between us and our stockholders. Our restated certificate of incorporation further provides that the federal district courts of the United States are the sole and exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. These choice of forum provisions could limit our stockholders' ability to obtain a more favorable judicial forum for disputes with us or our directors, officers or employees.

Our restated certificate of incorporation provides that the Court of Chancery of the State of Delaware is the exclusive forum for any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our certificate of incorporation or our bylaws; or any action asserting a claim against us that is governed by the internal affairs doctrine. We do not intend to have this choice of forum provision apply to, and this choice of forum provision will not apply to, actions arising under the Securities Exchange Act of 1934, as amended, or the Exchange Act.

Our restated certificate of incorporation further provides that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act of 1933, as

amended, or the Securities Act. On March 18, 2020, the Delaware Supreme Court, in Sciabacucchi v. Salzberg, et al., Civil Action No. 2017-0931-JTL (Del. Ch. Dec. 19, 2018), upheld the facial validity of such federal forum selection provisions.

These choice of forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. Alternatively, if a court were to find the choice of forum provisions contained in our certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could materially adversely affect our business, financial condition, results of operations and prospects.

General Risk Factors

The requirements of being a public company may strain our resources, divert management's attention and affect our ability to attract and retain qualified board members.

As a public company, we are subject to the reporting requirements of the Exchange Act, the listing requirements of the Nasdaq Stock Market and other applicable securities rules and regulations. Compliance with these rules and regulations have increased our legal and financial compliance costs, made some activities more difficult, time-consuming or costly, and increased demand on our systems and resources, and will continue to do so, particularly now that we are no longer an emerging growth company. Among other things, the Exchange Act requires that we file annual, quarterly and current reports with respect to our business and results of operations and maintain effective disclosure controls and procedures and internal control over financial reporting. We will continue to require significant resources and management oversight in order to maintain and, if required, improve our disclosure controls and procedures and internal control over financial reporting to meet this standard. As a result, management's attention may be diverted from other business concerns, which could harm our business and results of operations. We may need to hire more resources to comply with these requirements in the future, which will increase our costs and expenses. We are required to conduct annual evaluations of the effectiveness of our internal control over financial reporting, including to identify and remediate any deficiencies in those internal controls. We may not be able to complete our evaluation, testing and any required remediation in a timely fashion. During the evaluation and testing process for 2022, we identified material weaknesses in our internal control over financial reporting that we were unable to remediate before the end of the fiscal year, and therefore we were unable to assert that our internal controls are effective. As noted in "Part II, Item 9A – Controls and Procedures", we have commenced a remediation program that will consume significant resources and management attention until such remediation initiatives are complete.

In addition, changing laws, regulations and standards relating to corporate governance and public disclosure are increasing legal and financial compliance costs and making some activities more time-consuming. We have invested and will continue to invest in resources to comply with evolving laws, regulations and standards, and this investment has resulted and may continue to result in increased selling, general and administrative expense and a diversion of management's time and attention from revenue-generating activities to compliance activities. If our efforts to comply with new laws, regulations and standards differ from the activities intended by regulatory or governing bodies, regulatory authorities may initiate legal proceedings against us and our business may be harmed.

As a result of being a public company, it is more expensive for us to obtain director and officer liability insurance, and in the future we may be required to accept reduced coverage or incur substantially higher costs to obtain coverage. These factors could also make it more difficult for us to attract and retain qualified members of our board of directors and qualified executive officers.

We are exposed to fluctuations in currency exchange rates, which could adversely affect our business, financial condition, results of operations and prospects.

Our sales agreements are primarily denominated in U.S. dollars. Therefore, a strengthening U.S. dollar could increase the real cost of our products to our customers outside of the U.S., and alternatively a decrease in the value of the U.S. dollar relative to foreign currencies could increase our product and operating costs in foreign locations. If we are not able to successfully hedge against the risks associated with the currency fluctuations, our business, financial condition, results of operations and prospects could be materially adversely affected.

Failure to comply with governmental laws and regulations could materially adversely affect our business, financial condition, results of operations and prospects.

Our business is subject to regulation by various federal, state, local and foreign governmental agencies, including agencies responsible for monitoring and enforcing employment and labor laws, workplace safety, product safety, environmental laws, consumer protection laws, anti-bribery laws, import/export controls, foreign investment, federal securities laws and tax laws and regulations. In certain jurisdictions, these regulatory requirements may be more stringent than those in the United States. From time to time, we may receive inquiries from such governmental agencies or we may make voluntary disclosures regarding our compliance with applicable governmental regulations or requirements. Noncompliance with applicable government regulations or requirements could subject us to sanctions, mandatory product recalls, enforcement actions, disgorgement of profits, fines, damages, civil and criminal penalties or injunctions. If any governmental sanctions are imposed, or if we do not prevail in any possible civil or criminal litigation, our business, financial condition, results of operations and prospects could be materially adversely affected. In addition, responding to any action will likely result in a significant diversion of management's attention and resources and an increase in professional fees. Enforcement actions and sanctions could materially adversely affect our business, financial condition, results of operations and prospects.

We are subject to anti-corruption laws such as the FCPA.

We are subject to anti-corruption laws such as the FCPA, which generally prohibits U.S. companies and their employees and intermediaries from making corrupt payments to foreign officials for the purpose of obtaining or keeping business, securing an advantage or directing business to another individual or entity, and requires companies to maintain accurate books and records. Under the FCPA, U.S. companies may be held liable for the corrupt actions taken by directors, officers, employees, agents, or other strategic or local partners or representatives. We rely on non-employee third-party representatives and other intermediaries to develop international sales opportunities, and generally have less direct control over such third parties' actions taken on our behalf. If we or our intermediaries fail to comply with the requirements of the FCPA or similar legislation, governmental authorities in the United States and elsewhere could seek to impose civil and/or criminal fines and penalties, which could have a material adverse effect on our business, reputation, results of operations and financial condition. We intend to increase our international sales and business and, as such, the cost of complying with such laws, and the potential harm from our noncompliance, are likely to increase.

Failure to comply with anti-corruption laws, such as the FCPA and the United Kingdom Bribery Act 2010, or the Bribery Act, and similar laws associated with our activities outside the United States, could subject us to penalties and other adverse consequences. Any violation of the FCPA, Bribery Act or similar laws could result in whistleblower complaints, adverse media coverage, investigations, loss of export privileges, severe criminal or civil sanctions suspension, or debarment from U.S. government contracts, all of which could have a material adverse effect on our reputation, business, results of operations and prospects. In addition, responding to any enforcement action or related investigation may result in a materially significant diversion of management's attention and resources and significant defense costs and other professional fees.

Our failure to adequately protect personal data and to comply with related laws and regulations could result in material liability.

A wide variety of provincial, state, national, foreign, and international laws and regulations apply to the collection, use, retention, protection, disclosure, transfer (including across national boundaries), and other processing of personal data. These data protection and privacy-related laws and regulations are evolving and being tested in courts and may result in ever-increasing regulatory and public scrutiny and escalating levels of enforcement and sanctions.

Any failure by us to comply with applicable data privacy laws and regulations, or to protect such data, could result in enforcement action against us, including fines, imprisonment of company officials, public censure, claims for damages by end customers and other affected persons and entities, damage to our reputation and loss of goodwill, and other forms of injunctive or operations-limiting relief, any of which could have a material adverse effect on our operations, financial performance, and business.

Definitions of personal data and personal information, and requirements relating to the same under applicable laws and regulations within the European Union, the United States, Australia, and elsewhere, change frequently and are subject to new and different interpretations by courts and regulators. Because the interpretation and application of laws and other obligations relating to privacy and data protection are uncertain, it is possible that existing or future laws, regulations, and other obligations may be interpreted and applied in a manner that is inconsistent with our data management practices. We may be required to expend significant resources to modify our products and otherwise adapt to these changes, which we may be unable to do on commercially reasonable terms or at all, and our ability to develop new products and features could be limited. These developments could harm our business, financial condition and results of operations. Even if not subject to legal challenge, the perception of privacy concerns, whether or not valid, may harm our reputation and inhibit adoption of our products by current and prospective customers.

Changes in U.S. and foreign tax rules and regulations, or interpretations thereof, may give rise to potentially adverse tax consequences and adversely affect our financial condition.

We are expanding our international operations and staff to better support our growth into international markets. We generally conduct our international operations through wholly-owned subsidiaries and report our taxable income in various jurisdictions worldwide based upon our business operations in those jurisdictions. Our corporate structure and associated transfer pricing policies contemplate the business flows and future growth into the international markets, and consider the functions, risks and assets of the various entities involved in the intercompany transactions. The amount of taxes we pay in different jurisdictions will depend to a significant degree on the application of the tax laws of the various jurisdictions to our international business activities, changes in tax rates, new or revised tax laws or interpretations of existing tax laws and policies and our ability to operate our business in a manner consistent with our corporate structure and intercompany arrangements, any or all of which could result in additional tax liabilities or increases in, or in the volatility of, our effective tax rate.

The taxing authorities of the jurisdictions in which we operate may challenge our methodologies for pricing intercompany transactions, which are required to be computed on an arm's-length basis pursuant to the intercompany arrangements or disagree with our determinations as to the income and expenses attributable to specific jurisdictions. If such a challenge or disagreement were to occur, and our position was not sustained, we could be required to pay additional taxes, interest and penalties, which could result in one-time tax charges, higher effective tax rates, reduced cash flows and lower overall profitability of our operations; in addition, it is uncertain whether any such adverse effects could be mitigated by corresponding adjustments in other jurisdictions with respect to the items affected. Our financial statements could fail to reflect adequate reserves to cover such a contingency.

Further changes in the tax laws of foreign jurisdictions could arise, including as a result of the base erosion and profit shifting project undertaken by the Organization for Economic Co-operation and Development, or the OECD. The OECD, which represents a coalition of member countries, has issued recommendations that, in some cases, make substantial changes to numerous long-standing tax positions and principles; many of these changes have been adopted or are under active consideration by OECD members and/or other countries.

Portions of our operations are subject to a reduced tax rate under various tax holidays and rulings. We also utilize tax rulings and other agreements to obtain certainty in treatment of certain tax matters. These tax holidays and rulings expire in whole or in part from time to time and may be extended when certain conditions are met or terminated if certain conditions are not met. The impact of any changes in conditions would be the loss of certainty in treatment thus potentially impacting our effective income tax rate.

Recent changes to the U.S. tax laws impact the tax treatment of foreign earnings by, among other things, creating limits on the ability of taxpayers to claim and utilize foreign tax credits, imposing minimum effective rates of current tax on certain classes of foreign income, and imposing additional taxes in connection with specified payments to related foreign recipients, among other items. While some of these changes may be adverse on a going forward basis, others may provide benefits that may be applicable to us. Due to our existing international business activities, which we anticipate expanding, any additional guidance such as U.S Treasury regulations and administrative interpretations may increase our worldwide effective tax rate and adversely affect our financial condition and operating results.

Effective January 1, 2022, the Tax Cuts and Jobs Act of 2017 requires us to capitalize, and subsequently amortize R&D expenses over five years for research activities conducted in the United States and over fifteen years for research activities conducted outside of the United States. This will result in a material increase to our U.S. income tax liability and net deferred tax assets and a material decrease to our cash flows provided from operations. Furthermore, since we provide for a full valuation allowance against our U.S. deferred tax assets, this will have an adverse effect on our effective tax rate. The actual impact will depend on multiple factors, including the amount of R&D expenses incurred and whether the research activities are performed within or outside of the United States.

We are also subject to the examination of our tax returns by the U.S. Internal Revenue Service, or IRS, and other tax authorities. The final determination of tax audits and any related disputes could be materially different from our historical income tax provisions and accruals and could have an adverse effect on our financial statements for the period or periods for which the applicable final determinations are made.

Taxing authorities may successfully assert that we should have collected or in the future should collect sales and use, value added or similar taxes, and we could be subject to liability with respect to past or future sales, which could adversely affect our operating results.

We do not collect sales and use, value added or similar taxes in all jurisdictions in which we have sales, and we have been advised that such taxes are not applicable to our products and services in certain jurisdictions. Sales and use, value added, and similar tax laws and rates vary greatly by jurisdiction. Certain jurisdictions in which we do not collect such taxes may assert that such taxes are applicable, which could result in tax assessments, penalties and interest, to us or our end-customers

for the past amounts, and we may be required to collect such taxes in the future. If we are unsuccessful in collecting such taxes from our end-customers, we could be held liable for such costs. Such tax assessments, penalties and interest, or future requirements may adversely affect our operating results.

If we needed to raise additional capital to expand our operations and invest in new products, our failure to do so on favorable terms could reduce our ability to compete and could materially adversely affect our business, financial condition, results of operations and prospects.

Our Term Loan matures on December 20, 2023, and we may need to raise additional funds to expand our operations and invest in new products. We may not be able to obtain additional debt or equity financing on favorable terms, if at all. Current capital market conditions, including the impact of inflation, have increased borrowing rates and, as we seek additional financing, we expect the cost of capital to increase significant compared to prior periods. Debt financing, if available, may involve restrictive covenants and could reduce our operational flexibility, and any new or refinanced debt may be subject to substantially higher interest rates, which could adversely affect our financial condition and impact our business. Recent quantitative tightening by the U.S. Federal Reserve, along with other central banks around the world, may further negatively affect our short-term ability or desire to incur debt. If we cannot raise funds on acceptable terms, we may not be able to grow our business or respond to competitive pressures.

Moreover, global capital markets have undergone periods of significant volatility and uncertainty in the past, and there can be no assurance that financing alternatives, such as equity financing, will be available to us on favorable terms or at all, should we determine it necessary or advisable to seek additional capital. If we do choose to raise additional equity financing, our stockholders may experience significant dilution of their ownership interests, and the market price of our common stock could decline.

Our business is subject to the risks of fire, power outages, floods and other catastrophic events and to interruption by manmade problems such as terrorism.

Our corporate headquarters and the operations of our key manufacturing vendors, as well as many of our customers, are located in areas exposed to risks of natural disasters such as fires and floods. A significant natural disaster, such as a fire, flood or other catastrophic events such as a disease outbreak, could have a material adverse effect on our or their business, which could in turn materially adversely affect our business, financial condition, results of operations and prospects. In the event our manufacturing or logistics abilities are hindered by any of the events discussed above, shipments could be delayed, which could result in missed financial targets, such as revenue and shipment targets, for a particular quarter. Further, if a natural disaster occurs in a region from which we derive a significant portion of our revenue, customers in that region may delay or forego purchases of our products, which could materially adversely affect our business, financial condition, results of operations and prospects. In addition, acts of terrorism could cause disruptions in our business or the business of our manufacturers, logistics providers, partners or customers or the economy as a whole. All of the aforementioned risks may be compounded if our disaster recovery plans and those of our manufacturers, logistics providers or partners prove to be inadequate. To the extent that any of the above results in delays or cancellations of customer orders, or delays in the manufacture, deployment or shipment of our products, our business, financial condition, results of operations and prospects would be adversely affected.

The elimination of LIBOR could adversely affect our business, results of operations or financial condition.

In July 2017, the head of the United Kingdom Financial Conduct Authority announced plans to phase out the use of LIBOR by June 30, 2023. Although timing for this phase-out, as well the impact of a replacement reference rate for our outstanding term loan, are uncertain at this time, the elimination of LIBOR could have an adverse impact on our business, results of operations, or financial condition. We may incur significant expenses to amend our LIBOR-indexed loans, derivatives, and other applicable financial or contractual obligations, including our credit facilities, to a new reference rate, which may differ significantly from LIBOR. Accordingly, the use of an alternative rate could result in increased costs, including increased interest expense on our credit facilities, and increased borrowing and hedging costs in the future. Additionally, the elimination of LIBOR may adversely impact the value of and the expected return on our existing derivatives, if any. At this time, no final consensus exists as to what rate or rates may become acceptable alternatives to LIBOR and we are unable to predict the effect of any such alternatives on our business, results of operations or financial condition.

If securities or industry analysts cease publishing research or reports about us, our business or our market, or if they publish negative evaluations of our stock or the stock of other companies in our industry, the price of our stock and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts may publish about us, our business, our market or our competitors. If one or more of the industry analysts covering our business downgrade their evaluations of our stock or the stock of other companies in our industry, the price of our stock could decline. If one or more of these analysts cease to cover our stock, we could lose visibility in the market for our stock, which in turn could cause our stock price to decline.

We are subject to U.S. foreign investment regulations which may impose additional burdens on or may limit certain investors' ability to purchase our common stock, potentially making our common stock less attractive to investors.

In October 2018, the U.S. Department of Treasury announced a pilot program to implement part of the Foreign Investment Risk Review Modernization Act, or FIRRMA, effective November 10, 2018. The pilot program expands the jurisdiction of the Committee on Foreign Investment in the United States, or CFIUS, to include certain direct or indirect foreign investments in a defined category of U.S. companies, including companies involved in manufacturing communications equipment. Among other things, FIRRMA empowers CFIUS to require certain foreign investors to make mandatory filings and permits CFIUS to charge filing fees related to such filings. Such filings are subject to review by CFIUS. Any such restrictions on the ability to purchase shares of our common stock that have the effect of delaying or deterring a change in control could limit the opportunity for our stockholders to receive a premium for their shares of our common stock and could also affect the price that some investors are willing to pay for our common stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

Facilities

Our corporate headquarters is located in Andover, Massachusetts and consists of approximately 122,000 square feet of space. We own the property constituting our corporate headquarters, and prior to July 1, 2020, we were subject to an $8.0 million mortgage loan. The annual interest rate on the loan was 3.5%, and the loan was repayable in 60 monthly installments of principal and interest based on a 20-year amortization schedule. The remaining amount of unpaid principal under the loan of $6.5 million was paid on its maturity date of July 1, 2020.

We lease additional facilities in Lawrence, Massachusetts and Limerick, Ireland that we use for manufacturing, testing, logistics, and customer support; facilities in Guangzhou, China, that we use for manufacturing, testing, logistics, research and development and technical support; facilities in Sydney, Australia that we use for logistics, customer support and research and development; and facilities in Valencia, Spain, Pak Shek Kok, Hong Kong, and Shenzhen and Hefei, China that we use primarily for research and development.

We believe that our current facilities are adequate to meet our current needs. We anticipate expanding our facilities as we add employees and enter new geographic markets. We believe that suitable additional or alternative space will be available on acceptable terms as needed to accommodate future growth.

Item 3. Legal Proceedings.

From time to time, we are a party to various litigation matters and subject to claims that arise in the ordinary course of business including, for example, patent infringement lawsuits by non-practicing entities. In addition, third parties may from time to time assert claims against us in the form of letters and other communications.

Item 4. Mine Safety Disclosures.

Not applicable.

PART II

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

Market Information

Our common stock trades on the Nasdaq Global Select Market under the symbol "CASA". Trading of our common stock on the Nasdaq Global Select Market commenced on December 15, 2017 in connection with our initial public offering, or IPO. Prior to that time, there was no established public trading market for our common stock.

Holders of Record

As of January 31, 2023, there were 14 holders of record of our common stock. Because many of our shares are held by brokers and other institutions on behalf of stockholders, we are not able to estimate the number of stockholders represented by these record holders.

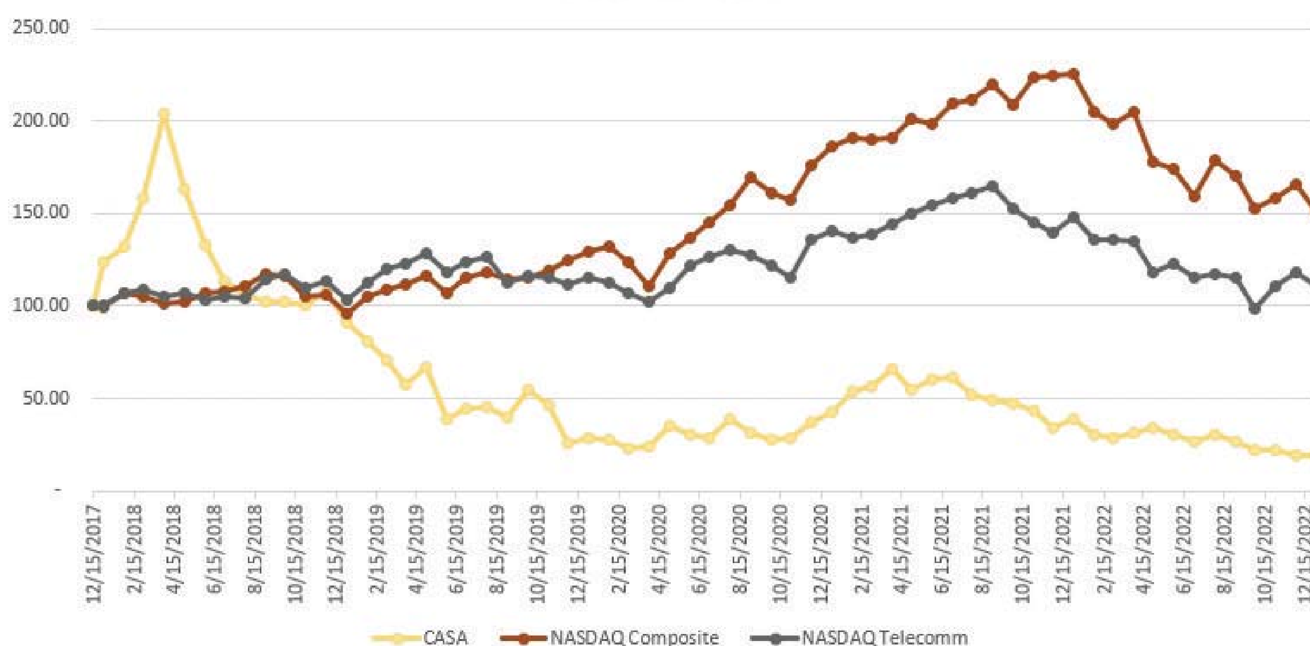
Dividend Policy

Although we declared special dividends on five occasions prior to our initial public offering, we do not anticipate that we will declare any cash dividends to holders of our common stock in the foreseeable future. Any future determination to declare dividends will be made at the discretion of our board of directors and will depend on a number of factors, including future earnings, capital requirements, financial conditions, future prospects, contractual restrictions and covenants, and other factors that our board of directors may deem relevant. Our credit facility contains covenants that limit our ability to pay dividends on our capital stock.

Performance Graph

This performance graph shall not be deemed to be "soliciting material" or to be "filed" with the SEC for purposes of Section 18 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, or otherwise subject to liabilities under that section, and shall not be deemed to be incorporated by reference into any of our filings under the Securities Act of 1933, as amended, or the Exchange Act, except to the extent that we specifically incorporate it by reference into such filing.

The following graph compares the cumulative total return to stockholders for our common shares for the period from December 15, 2017 (the date our common stock began trading on the Nasdaq Global Select Market) through December 31, 2022 with the Nasdaq Composite Index. The comparison assumes an investment of $100 was made on December 15, 2017 in our common shares and in each of the indices and in the case of the indices it also assumes reinvestment of all dividends. The performance shown is not necessarily indicative of future performance.



Recent Sales of Unregistered Equity Securities

None.

Issuer Repurchases of Equity Securities

The following table sets forth information with respect to repurchases of shares of our common stock during the three-month period ended December 31, 2022.

Period	Total Number of Shares Purchased (In thousands)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (In thousands)	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (1) (In thousands)
October 1 - October 31, 2022	—	$ —	—	$ 60,234
November 1 - November 30, 2022	—	$ —	—	$ 60,234
December 1 - December 31, 2022	—	$ —	—	$ 60,234

(1) On February 21, 2019, we announced that our board of directors authorized the repurchase of up to $75.0 million of our common stock under a stock repurchase program. From inception through December 31, 2022, we repurchased approximately 3.6 million shares under the program for approximately $14.8 million before commissions. The stock repurchase program has no expiration date, does not require us to purchase a minimum number of shares, and may be suspended, modified or discontinued at any time without prior notice. However, based on our net leverage ratio at December 31, 2022, our ability to repurchase shares is currently restricted.

Use of Proceeds

On December 19, 2017, we closed our initial public offering of common stock under a registration statement on Form S-1 (File No. 333-221658) that was declared effective by the SEC on December 14, 2017. The net offering proceeds to us from the offering, after deducting underwriting discounts of $6.3 million and offering expenses payable by us totaling $4.1 million, were approximately $79.3 million. No offering discounts, commissions or expenses were paid directly or indirectly to any of our directors or officers (or their associates) or persons owning 10.0% or more of any class of our equity securities or to any other affiliates. There has been no material change in the planned use of proceeds from our initial public offering as described in our final prospectus filed with the SEC on December 15, 2017, pursuant to Rule 424(b)(4) promulgated under the Securities Act. As of December 31, 2022, we had not used any of the net offering proceeds and we have invested the proceeds into an investment portfolio with the primary objective of preserving principal and providing liquidity without significantly increasing risk.

Item 6. Reserved.

Not Applicable.

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

The following discussion of our financial condition and results of operations should be read together with our consolidated financial statements and related notes and other financial information included elsewhere in this Annual Report on Form 10-K. The following discussion contains forward-looking statements that reflect our plans, estimates and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this Annual Report on Form 10-K, particularly in the section titled "Risk Factors." For discussion comparing the period ended December 31, 2021 to December 31, 2020, please refer to our Annual Report on Form 10-K, filed with the SEC on February 25, 2022.

Overview

With our physical, virtual and cloud-native 5G infrastructure and customer premise networking equipment solutions, we help our CSP customers transform and expand their public and private high-speed data and multi-service communications networks so they can meet the growing demand for bandwidth and new services. Our core and edge convergence technology enables CSPs and enterprises to cost-effectively and dynamically increase network speed, add bandwidth capacity and new services, reduce network complexity, and reduce operating and capital expenditures regardless of access technology.

We offer scalable solutions that can meet the evolving bandwidth needs of our customers and their subscribers. Our first installation in a service provider's network frequently involves deploying our broadband products in only a portion of the provider's network and, for our cable products, with only a fraction of the capacity of our products enabled at the time of initial installation. Over time, our customers have generally expanded the use of our solutions to other areas of their networks to extend network coverage or increase network capacity.

Our solutions are commercially deployed in over 70 countries by more than 475 customers, including regional service providers as well as some of the world's largest Tier 1 CSPs, serving millions of subscribers.

Global and Macroeconomic Considerations

Rising Inflation and Interest Rates

Supply chain disruption and other economic conditions have led to a recent rise in inflation, which has caused increases in the costs to produce our products, much of which we were not immediately able to pass on to our customers due to fixed price agreements. Increased inflation may result in decreased demand for our products and services, increased operating costs (including our labor costs), reduced liquidity and limitations on our ability to access credit or otherwise raise debt and equity capital. In addition, the U.S. Federal Reserve has raised, and may again raise interest rates in response to concerns about inflation. Increases in interest rates, especially if coupled with reduced government spending and volatility in financial markets, may have the effect of further increasing economic uncertainty and heightening these risks. In an inflationary environment, due to our fixed price agreements, we may be unable to raise the prices of our products and services commensurate with or above the rate at which our costs increase. We also may experience lower than expected sales and potential adverse impacts on our competitive position if there is a decrease in consumer spending or a negative reaction to our pricing for new customers.

In addition, because our outstanding debt bears interest at variable interest rates, the recent increases in interest rates will result in increased future debt service costs. Continued increases in interest rates will further increase the cost of servicing our outstanding indebtedness.

COVID-19 Pandemic

The COVID-19 pandemic disrupted our global supply chain. Throughout 2022 and 2021, we experienced shipping bottlenecks and shortages of supply that resulted in our inability to fulfill certain customer orders within normal lead times. This adversely impacted our revenue and operating results for the years ended December 31, 2022 and 2021. We have also seen, in some cases, significant increases in shipping costs. While we continue to work with our supply chain, contract manufacturers, logistics partners and customers to minimize the extent of such impacts, we expect the effects of global supply chain issues to continue and cannot predict if or when such effects will subside. This may prevent us from being able to fulfill our customers' orders in a timely manner or at all, which could lead to one or more of our customers canceling their orders. At this time, we are neither able to estimate the extent of these impacts nor predict whether our efforts to minimize or contain them will be successful.

In addition to the negative impact on our business from global supply chain challenges related to COVID-19, we derived certain benefits that included decreases in certain operating expenses, such as travel and trade show expense, and benefited

from certain U.S. government tax relief measures. These benefits began to gradually diminish throughout 2022 and may continue to do so as the various geographies in which we operate continue to recover from the pandemic.

Of particular significance, for the year ended December 31, 2021, we were able to benefit from the Coronavirus Aid, Relief and Economic Security Act, or the CARES Act, that was signed into law on March 27, 2020. The CARES Act, among other things, includes tax provisions relating to refundable payroll tax credits, deferment of employer's Social Security payments, net operating loss utilization and carryback periods, modifications to the net interest deduction limitations and technical corrections to tax depreciation methods for qualified improvement property, or QIP. For the year ended December 31, 2021, we recognized a reduction to cost of goods sold of $0.6 million and a reduction in operating expenses of $4.3 million, in connection with a payroll tax credit under the CARES Act. For the year ended December 31, 2021 we recognized an income tax benefit of $7.1 million (see Note 9, *Income Taxes*, to our accompanying financial statements) due to the net operating loss carryback provisions of the CARES Act. We will continue to evaluate the impact of the CARES Act on our financial position, results of operations, and cash flows.

At this time, we are neither able to estimate the extent of these impacts nor predict whether our efforts to minimize or contain them will be successful. We intend to continue to monitor our business very closely for any effects of COVID-19, inflation and interest rates for as long as necessary.

Due to the above circumstances and as described generally in this Annual Report on Form 10-K, our results of operations for the years ended December 31, 2022 and 2021 are not necessarily indicative of the results to be expected in future years.

Our Business Model

We derive revenue from sales of our products and services, including software, substantially all of which is pursuant to perpetual licenses. Prior to the year ended December 31, 2020, the majority of our product revenue came from sales of our broadband products, particularly our C100G CCAP solution to cable operators worldwide. In the years ended December 31, 2022 and 2021, sales of our wireless and fixed-line broadband products to mobile network operators and diversified CSPs globally comprised a majority of our revenue. We generate service revenue primarily from sales of maintenance and support services, which end customers typically purchase in conjunction with our products, and, to a lesser extent, from sales of professional services and extended warranty services.

We offer end-to-end physical, virtual and cloud-native communications network infrastructure and customer premise network solutions that enable our customers to provide fixed and wireless ultra-broadband services to consumers and enterprises.

We market and sell our products and services through our direct global sales force, supported by sales agents, and through resellers. A majority of our revenue is derived from direct sales, which generate higher gross margins than sales made through resellers. Our sales organization includes systems engineers with deep technical expertise that provide pre-sales technical support. These systems engineers also assist with post-sales support. Our resellers receive an order from an end customer prior to placing an order with us, and we confirm the identification of or are aware of the end customer prior to accepting such orders. We use sales agents to assist our direct global sales force in the sales process with certain customers primarily located in Latin America and Asia-Pacific. If a sales agent is engaged in the sales process, we receive the order directly from and sell the products and services directly to the end customer, and we pay a commission to the sales agent, calculated as a percentage of the related customer payment.

Each of our sales teams is responsible for a geographic territory and/or has responsibility for a number of major direct end-customer accounts. We have a diverse, global customer base, and our revenue by geographic region fluctuates from period to period based on the timing of customer projects. The percentages of our revenue derived from customers in each geographic region were as follows:

	Year Ended December 31,		
	2022	2021	2020
Revenue by geographic region:			
North America	45.7%	55.1%	42.3%
Latin America	6.4%	6.9%	8.9%
Europe, Middle East and Africa	13.3%	7.6%	9.1%
Asia-Pacific	34.6%	30.4%	39.7%
Total	100.0%	100.0%	100.0%

The decrease in percentage of revenues in the North America region from the year ended December 31, 2021 to 2022 is due to decreased wireless and fixed-line broadband device shipments to our Tier 1 customers which had significantly increased in the prior year. The increase in percentage of revenues in the North America region from the year ended December 31, 2020 to 2021 is attributed primarily to increased wireless product sales to our Tier 1 customers.

The increase in percentage of revenue in the Asia-Pacific region from the year ended December 31, 2021 to 2022 is due to improvements in supply chain issues experienced in the previous year. The decrease in percentage of revenue in the Asia-Pacific region from the year ended December 31, 2020 to 2021 is attributed to the decline of wireless and fixed-line broadband device shipments due to supply chain issues.

Our growth strategy focuses on the following key areas:

Continue to Innovate and Extend Technology Leadership Through R&D Investment

We believe that we offer market-leading broadband infrastructure products today. We intend to continue to enhance our existing products and develop new products in both our current and adjacent markets. For example, we have invested in and launched virtual CCAP solutions and distributed access architecture solutions to allow our cable customers to densify their networks, providing higher bandwidth, which enhances user experience. Additionally, we have been investing in, and have been recognizing revenue from, our core, access and customer premise technology products for 4G/LTE and 5G wireless networks.

Further Penetrate Existing Customers

Our customers often deploy our products in a specific region or for a specific application, which may only account for a portion of their overall network infrastructure needs. We plan to expand our footprint within the networks of existing customers as they realize the technological and financial benefits of our solutions, as well as sell our new products to them as they offer new broadband services to their subscribers.

Expand our Customer Base by Expanding the Breadth of Solutions Sold to Customers

We intend to sell additional products and solutions to our growing installed base of CSPs, particularly as they increasingly offer converged services to their subscribers. While we initially focused on providing broadband solutions for cable service providers due to our founders' experience in the cable industry, since our IPO we have expanded our products to include wireless and fixed-line broadband solutions that we sell to cable operators, mobile network operators and diversified communications service providers globally.

Invest in Our Platform through Selective Acquisitions

We may selectively pursue acquisitions that are consistent with our overall growth strategy. For example, on July 1, 2019, we acquired NetComm for cash consideration of approximately $162.0 million Australian dollars, or AUD ($112.7 million United States dollars, or USD, based on an exchange rate of USD $0.700 per AUD $1.00 on July 1, 2019). This acquisition has enabled us to expand our customer base, enhance our global footprint, extend our product portfolio to customer premise networking technology and further diversify our revenue sources. As discussed in further detail below, the NetComm acquisition had a material impact on our business and is expected to have a material impact on our future performance.

Key Components of Our Results of Operations

Revenue

We generate product revenue from sales of next-generation physical, virtual and cloud-native architectures for cable, wireless and fixed-line broadband networks. Our products enable our service provider customers to cost-effectively deliver ultra-broadband services to their consumer and enterprise customers.

We generate service revenue from sales of initial maintenance and support services contracts, which are typically purchased by end customers in conjunction with our products, and from our customers' subsequent annual renewals of those contracts. We offer maintenance and support services under renewable, fee-based contracts, which include telephone support and unspecified software upgrades and updates provided on a when-and-if-available basis. To a lesser extent, we generate service revenue from sales of professional services, such as installation and configuration, and extended warranty services.

The sale of our products generally includes a 90-day warranty on the software and one-year to two-year warranties on the hardware component of the products, which includes repair or replacement of the applicable hardware. We record a warranty accrual for the initial software and hardware warranty included with our product sales and do not defer revenue. In addition, in conjunction with customers' renewals of maintenance and support services contracts, we offer an extended warranty for periods typically of one to three years for agreed-upon fees, which we record as service revenue.

Cost of Revenue

Our cost of product revenue consists primarily of the costs of procuring goods, such as CCAP chassis, cable access products, line cards embedded with Field Programmable Gate Arrays, or FPGAs, and components for our fixed wireless access and FTTdp devices. In addition, cost of product revenue includes salary and benefit expenses, including stock-based compensation, for manufacturing and supply-chain management personnel, allocated facilities-related costs, estimated warranty costs, third-party logistics costs, estimated costs associated with excess and obsolete inventory and amortization expense related to certain acquired intangible assets.

Our cost of service revenue includes salary and benefit expenses, including stock-based compensation, for our maintenance and support services and professional services personnel, fees incurred for subcontracted professional services provided to our customers, and allocated facilities-related costs.

Gross Profit

Our product gross profit and gross margin have been, and may in the future be, influenced by several factors, including changes in the volume of our software products sold, product configuration, sales of capacity expansions, geographic location of our customers, pricing due to competitive pressure, estimated warranty costs, inventory obsolescence, and favorable and unfavorable changes in inventory production volume and component costs. As some products mature, the average selling prices of those products may decline. In addition, gross margins on customer premise devices are lower than on our legacy broadband hardware products. Our service gross profit and gross margin have been, and may in the future be, influenced by the amount and timing of renewals of maintenance and support services contracts by customers, pricing due to competitive pressure and, to a lesser extent, the amount of professional services ordered by customers and performed by us. To the extent that software products increase as a percentage of revenue in 2023, we would expect that our gross margin will increase for the year ended December 31, 2023 as compared to the year ended December 31, 2022.

Operating Expenses

Our operating expenses consist of research and development and selling, general and administrative expenses.

Research and Development Expenses

Research and development expenses consist primarily of salary and benefit expenses, including stock-based compensation, for our employees engaged in research, design and development activities. Research and development expenses also include project-specific engineering services purchased from external vendors, prototype costs, depreciation expense, amortization of purchased intellectual property, allocated facilities-related costs and travel expenses.

We expect that our research and development costs may increase in the near term as we continue to make investments to enhance our existing products, develop new products and technologies, including our new wireless and fixed-line broadband solutions, and in the event that any expense reductions related to COVID-19 reverse.

Selling, General and Administrative Expenses

Selling, general and administrative expenses include salary and benefit expenses, including stock-based compensation, for employees and costs for contractors engaged in sales, marketing, general and administrative activities. Selling, general and administrative expenses also include commissions, calculated as a percentage of the related customer payment, to sales agents that assist us in the sales process with certain customers primarily located in the Latin America and Asia-Pacific regions. These sales agent commissions fluctuate from period to period based on the amount and timing of sales to the customers subject to sales agent commissions. Selling, general and administrative expenses also include marketing activities, such as travel expenses, trade shows, marketing programs and promotional materials, amortization expense related to certain acquired intangible assets, professional services, such as legal and accounting fees, as well as allocated facilities-related costs.

We expect that our selling, general and administrative expenses may increase in the near term as we continue to make investments in our sales and marketing organizations, expand our marketing programs and efforts to increase the market

awareness and sales of our products and services, and in the event that any expense reductions realized related to COVID-19 continue to decline.

Other Income (Expense), Net

Other income (expense), net consists of interest income from our investments in short-term financial instruments, such as certificates of deposit and money market mutual funds, and interest expense associated with our term loan credit facility. Other income (expense), net also includes gains on the extinguishment of debt, realized and unrealized gains and losses from foreign currency transactions, and interest and penalties associated with uncertain tax positions. We hedge certain significant transactions denominated in currencies other than the U.S. dollar, and we expect to continue to do so to minimize our exposure to foreign currency fluctuations.

Provision for (Benefit from) Income Taxes

We are subject to income taxes in the United States and the foreign jurisdictions in which we do business. These foreign jurisdictions have statutory tax rates different from those in the United States. Our effective tax rates will vary depending on the relative proportion of foreign to U.S. income, the utilization of foreign tax credits and research and development tax credits, changes in corporate structure, the amount and timing of certain employee stock-based compensation transactions, changes in the valuation allowance maintained against our deferred tax assets and changes in tax laws and interpretations. We plan to regularly assess the likelihood of outcomes that could result from the examination of our tax returns by the U.S. Internal Revenue Service and other tax authorities to determine the adequacy of our income tax reserves and expense. Should actual events or results differ from our then-current expectations, charges or credits to our provision for income taxes may become necessary. Any such adjustments could have a significant effect on our results of operations.

For taxable years beginning after January 1, 2018, taxpayers are subjected to the global intangible low-taxed income provisions, or GILTI provisions. The GILTI provisions require us to currently recognize in U.S. taxable income a deemed dividend inclusion of foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary's tangible assets. The ability to benefit from a deduction and foreign tax credits against a portion of the GILTI income may be limited under the GILTI rules as a result of the utilization of net operating losses, foreign sourced income, and other potential limitations within the foreign tax credit calculation. For the years ended December 31, 2022, 2021 and 2020, we recorded an income tax charge of $0.7 million, $2.6 million, and $3.5 million, respectively, related to GILTI. We have made an accounting policy election, as allowed by the SEC and the Financial Accounting Standards Board, or the FASB, to recognize the impacts of GILTI within the period incurred. Therefore, no U.S. deferred taxes are provided on GILTI inclusions of future foreign subsidiary earnings.

Effective January 1, 2022, the Tax Cuts and Jobs Act of 2017 requires us to capitalize, and subsequently amortize R&D expenses over five years for research activities conducted in the U.S. and over fifteen years for research activities conducted outside of the U.S. This has resulted in a material increase to our U.S. income tax liability and net deferred tax assets and a material decrease to our cash flows provided from operations. Furthermore, since we provide for a full valuation allowance against our U.S. deferred tax assets, this has had an adverse effect on our effective tax rate, as further described below.

Results of Operations

The following tables set forth our consolidated results of operations in dollar amounts and as a percentage of total revenue for the periods shown:

	Year Ended December 31,		
	2022	2021	2020
		(in thousands)	
Revenue:			
Product	$ 237,547	$ 353,942	$ 346,083
Service	48,990	47,383	47,163
Total revenue	286,537	401,325	393,246
Cost of revenue[1]:			
Product	164,988	208,451	187,706
Service	5,080	4,694	4,941
Warranty settlement provision	12,803	—	—
Total cost of revenue	182,871	213,145	192,647
Gross profit	103,666	188,180	200,599
Operating expenses:			
Research and development[1]	85,243	84,362	84,370
Selling, general and administrative[1]	86,903	85,563	92,016
Total operating expenses	172,146	169,925	176,386
(Loss) income from operations	(68,480)	18,255	24,213
Other expense, net	(10,110)	(14,761)	(14,464)
(Loss) income before provision for (benefit from) income taxes	(78,590)	3,494	9,749
Provision for (benefit from) income taxes	615	287	(15,052)
Net (loss) income	$ (79,205)	$ 3,207	$ 24,801

(1) Includes stock-based compensation expense related to stock options, stock appreciation rights and restricted stock units granted to employees and non-employee consultants as follows:

	Year Ended December 31,		
	2022	2021	2020
		(in thousands)	
Cost of revenue	$ 121	$ 137	$ 153
Research and development expense	2,972	2,665	2,447
Selling, general and administrative expense	10,188	12,017	10,555
Total stock-based compensation expense	$ 13,281	$ 14,819	$ 13,155

	Year Ended December 31,		
	2022	2021	2020
	(as a percentage of total revenue)		
Revenue:			
Product	83%	88%	88%
Service	17	12	12
Total revenue	100	100	100
Cost of revenue:			
Product	58	52	48
Service	2	1	1
Warranty settlement provision	4	—	—
Total cost of revenue	64	53	49
Gross profit	36	47	51
Operating expenses:			
Research and development	30	21	21
Selling, general and administrative	30	21	23
Total operating expenses	60	42	45
(Loss) income from operations	(24)	5	6
Other expense, net	(4)	(4)	(4)
(Loss) income before provision for (benefit from) income taxes	(27)	1	2
Provision for (benefit from) income taxes	—	—	(4)
Net (loss) income	(28)%	1%	6%

Percentages in the table above are based on actual values. As a result, some totals may not sum due to rounding.

Year Ended December 31, 2022 Compared to Year Ended December 31, 2021

Revenue

	Year Ended December 31,				Change	
	2022		2021			
	Amount	% of Total	Amount	% of Total	Amount	%
	(dollars in thousands)					
Revenue:						
Product	$ 237,547	82.9%	$ 353,942	88.2%	$(116,395)	(32.9)%
Service	48,990	17.1%	47,383	11.8%	1,607	3.4%
Total revenue	$ 286,537	100.0%	$ 401,325	100.0%	$(114,788)	(28.6)%
Revenue by geographic region:						
North America	$ 130,803	45.7%	$ 221,302	55.1%	$ (90,499)	(40.9)%
Latin America	18,357	6.4%	27,841	6.9%	(9,484)	(34.1)%
Europe, Middle East and Africa	38,226	13.3%	30,378	7.6%	7,848	25.8%
Asia-Pacific	99,151	34.6%	121,804	30.4%	(22,653)	(18.6)%
Total revenue	$ 286,537	100.0%	$ 401,325	100.0%	$(114,788)	(28.6)%

	Year Ended December 31,		Change	
	2022	2021	Amount	%
Product revenue:				
Wireless	$ 89,020	$ 170,233	$ (81,213)	(47.7)%
Fixed-line broadband	57,904	66,017	(8,113)	(12.3)%
Cable	90,623	117,692	(27,069)	(23.0)%
Total product revenue	237,547	353,942	(116,395)	(32.9)%
Service revenue				
Wireless	7,735	5,538	2,197	39.7%
Fixed-line broadband	3,898	5,034	(1,136)	(22.6)%
Cable	37,357	36,811	546	1.5%
Total service revenue	48,990	47,383	1,607	3.4%
Total revenue	$ 286,537	$ 401,325	$ (114,788)	(28.6)%

The decrease in product revenue was attributed to decreased demand for our products across all three product lines and adverse effects of supply chain delays. Wireless product revenue was also adversely impacted by reduced revenue from a certain Tier 1 customer that significantly reduced its purchases from us in 2022.

The overall increase in service revenue was primarily due to increased support renewals and continued sales of wireless services, partially offset by a decline in fixed-line broadband service revenue. The decline in fixed-line broadband service revenue was partially driven by a decline in professional services projects.

Cost of Revenue and Gross Profit

	Year Ended December 31,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Cost of revenue:				
Product	$ 164,988	$ 208,451	$ (43,463)	(20.9)%
Service	5,080	4,694	386	8.2%
Warranty settlement provision	12,803	—	12,803	100.0%
Total cost of revenue	$ 182,871	$ 213,145	$ (30,274)	(14.2)%

	Year Ended December 31,				Change	
	2022		2021			
	Amount	Gross Margin	Amount	Gross Margin	Amount	Gross Margin (bps)
	(dollars in thousands)					
Gross profit:						
Product	$ 72,559	30.5%	$145,491	41.1%	$(72,932)	(1,060)
Service	43,910	89.6%	42,689	90.1%	1,221	(50)
Warranty settlement provision	(12,803)	(4.5)%	—	—	(12,803)	(450)
Total gross profit	$103,666	36.2%	$188,180	46.9%	$(84,514)	(1,070)

The decrease in cost of product revenue was primarily attributed to decreased revenue, partially offset by increased shipping charges and component parts costs. The decrease was also partially offset by significant increases in our inventory reserves against certain of the Company's products and components that management has designated to be discontinued and as a result were adjusted to their estimated net realizable values. Product gross margin was also negatively impacted by the mix of products sold, with lower margin wireless products comprising a larger percentage of total revenue.

The decrease in gross margin was further driven by a warranty settlement provision of $12.8 million recorded during the year ended December 31, 2022. Please refer to Note 18, *Commitments and Contingencies,* of the accompanying consolidated financial statements for more discussion regarding this provision.

Research and Development

	Year Ended December 31,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Research and development	$ 85,243	$ 84,362	$ 881	1.0%
Percentage of revenue	29.7%	21.0%		

The increase in research and development expense was primarily a result of an increase of $2.2 million in personnel costs, resulting from an increase in salaries and benefits expenses of $1.6 million during the year ended December 31, 2022 due to increased headcount, an increase in stock-based compensation of $0.3 million and the impact of a 2021 reduction in payroll tax expenses due to a CARES Act credit of $2.6 million, which did not recur in 2022, partially offset by a decrease of $2.4 million in bonus expense. Allocated facilities costs increased by $0.4 million driven by increased average headcount. These increases were partially offset by a decrease in depreciation and amortization expense of $1.2 million in the year ended December 31, 2022 and a decrease in purchases of research and development materials during the year ended December 31, 2022, which were approximately $0.4 million less than for the year ended December 31, 2021.

Selling, General and Administrative

	Year Ended December 31,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Selling, general and administrative	$ 86,903	$ 85,563	$ 1,340	1.6%
Percentage of revenue	30.3%	21.3%		

The increase in selling, general and administrative expense was primarily driven by increases in professional services of $4.0 million, legal contingency expense of $1.1 million, trade show costs of $1.2 million and bad debt expense of $0.5 million. These increases were partially offset by a decrease in depreciation and amortization expense of $0.9 million, a decrease in facilities costs of $1.0 million, and a decrease in insurance costs of $0.5 million. Personnel costs also decreased by $3.2 million for the year ended December 31, 2022, driven by a decrease in bonus expense of $4.5 million and a decrease of $1.8 million in stock-based compensation, partially offset by increases in travel of $1.0 million due to lifting of COVID-19 restrictions, payroll taxes of $1.6 million due to a CARES Act credit during the year ended December 31, 2021, which did not recur in 2022, and severance expenses of $0.5 million.

Other Expense, Net

	Year Ended December 31,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Other expense, net	$ (10,110)	$ (14,761)	$ 4,651	(31.5)%
Percentage of revenue	(3.5)%	(3.7)%		

The change in other expense, net was primarily due to a $3.8 million increase in foreign exchange gain due to fluctuations in the Australian dollar and the China Renminbi exchange rates and a $2.7 million gain on extinguishment of debt (see Note 10, *Debt*, to our accompanying consolidated financial statements). There was also a $1.9 million increase in interest income due to higher interest rates for the year ended December 31, 2022, offset by a $2.6 million increase in interest expense due to increases in the interest rate on our term loan. In addition, due to a 2021 reduction of reserves for uncertain tax positions, other income decreased by $1.2 million in the year ended December 31, 2022.

Provision for (Benefit from) Income Taxes

	Year Ended December 31,		Change	
	2022	2021	Amount	%
	(dollars in thousands)			
Provision for (benefit from) income taxes	$ 615	$ 287	$ 328	114.3%
Effective tax rate	(0.8)%	8.2%		

The change in the provision for income taxes was impacted by a discrete benefit of $7.1 million recorded in 2021 related to finalizing the 2020 U.S. net operating loss to be carried back as part of the CARES Act. The change in the provision for income taxes was also impacted by the new requirement to capitalize and amortize all research and experimentation expenditures for U.S. tax purposes, which became effective under the Tax Cuts and Jobs Act ("TCJA") as of January 1, 2022. This new requirement resulted in a U.S. current income tax for the 2022 year and the corresponding deferred tax asset created is offset by a full valuation allowance. In addition, the change in tax expense was impacted by the Company incurring a significant global loss during 2022, which resulted in a tax benefit in certain foreign jurisdictions, as compared to the Company earning foreign profits during 2021 against which foreign tax expense was recorded. The change in the provision for income taxes was also impacted by changes in uncertain tax positions and the valuation allowance maintained against our deferred tax assets.

Liquidity and Capital Resources

Our principal sources of liquidity have been and continue to be our cash and equivalents and cash flows from operations. The following tables set forth our cash and cash equivalents and working capital as of December 31, 2022, 2021 and 2020 as well as our net cash flows for the years ended December 31, 2022, 2021 and 2020:

	As of December 31,		
	2022	2021	2020
		(in thousands)	
Consolidated Balance Sheet Data:			
Cash and cash equivalents	$ 126,312	$ 154,703	$ 157,455
Working capital	(32,133)	264,157	251,573

	Year Ended December 31,		
	2022	2021	2020
		(in thousands)	
Consolidated Cash Flow Data:			
Net cash (used in) provided by operating activities	$ (8,634)	$ 33,598	$ 53,642
Net cash used in investing activities	(4,419)	(5,326)	(5,585)
Net cash used in financing activities	(12,480)	(29,395)	(6,303)

As of December 31, 2022, we had cash and cash equivalents of $126.3 million and net current accounts receivable of $74.5 million.

We had outstanding borrowings under the Term Loan of $226.0 million at December 31, 2022, which matures on December 20, 2023. Because the Term Loan matures within one year and the Company does not currently have committed financing or available liquidity to meet such debt obligations if they were to become due in accordance with their current terms, there is substantial doubt about our ability to continue as a going concern. We continue to work with potential lenders to refinance the existing debt. Our future capital requirements may vary materially from those currently planned and will depend on many factors, including our rate of revenue growth; the mix of revenues and impact on related gross margins, the timing and extent of spending on research and development efforts and other business initiatives; purchases of capital equipment to support our growth; the expansion of our sales and marketing activities, expansion of our business through acquisitions or our investments in complementary products, technologies or businesses; the use of working capital to purchase additional inventory; the timing of new product introductions; market acceptance of our products; and overall economic conditions. To the extent that current and anticipated future sources of liquidity are insufficient to fund our future business activities and requirements, we may be required to seek additional equity or debt financing. In the event additional financing is required from outside sources, we may not be able to raise it on terms acceptable to us or at all.

From our inception through December 31, 2022, our board of directors has declared a special dividend on five separate occasions and has approved cash payments to the holders of our stock options, stock appreciation rights, or SARs, and RSUs, as equitable adjustments in connection with these special dividends. No dividend payments were made during the years ended December 31, 2022, 2021, and 2020, however, equitable adjustment payments totaled less than $0.1 million, $0.1 million, and $0.7 million in the years ended December 31, 2022, 2021 and 2020, respectively. As of December 31, 2022, all equitable adjustment payments that had been approved by our board of directors had been paid in full to the holders of our stock options, SARs and RSUs. We do not anticipate declaring cash dividends in the foreseeable future. Any future determination to declare dividends will be subject to the discretion of our board of directors and applicable law, and will depend on various factors, including our results of operations, financial condition, prospects, contractual restrictions and any other factors deemed relevant by our board of directors.

Cash Flows

Operating Activities

Our primary source of cash from operating activities has been from cash collections from our customers. We expect cash inflows from operating activities to be affected by increases or decreases in sales and timing of collections and by purchases and shipments of inventory. Our primary uses of cash from operating activities have been for inventory purchases, personnel costs and investment in sales and marketing and research and development. We expect cash outflows from operating activities to increase as a result of further investment in research and development and sales and marketing and increases in personnel costs as we continue to enhance our products and introduce new products in an effort to continue to expand our business.

During the year ended December 31, 2022, cash used in operating activities was $8.6 million, primarily resulting from our net loss of $79.2 million, partially offset by net non-cash expenses of $40.6 million and net cash provided by changes in our operating assets and liabilities of $30.0 million. The net cash provided by changes in our operating assets and liabilities during the year ended December 31, 2022 was primarily due to a $17.6 million decrease in prepaid income taxes, a $15.4 million increase in deferred revenue primarily due to the timing of revenue recognition related to a certain long-term customer project, a $10.5 million decrease in accounts receivable due to the timing of collections from customers, and a $5.7 million decrease in prepaid expenses and other assets. These sources of cash were partially offset by a $14.4 million increase in inventory, a $1.8 million decrease in accrued income taxes, a $2.4 million increase in operating lease liabilities, and a $0.7 million decrease in accounts payable and accrued expenses due to the timing of certain payments. .

Investing Activities

Our investing activities consist primarily of expenditures for lab and computer equipment and software to support the development of new products and increase our manufacturing capacity to meet customer demand for our products. In addition, our investing activities included expansion of and improvements to our facilities. As our business expands, we expect that we will continue to invest in these areas.

Net cash used in investing activities during the year ended December 31, 2022 was $4.4 million and consisted of purchases of property and equipment of $3.7 million and purchases of software licenses of $0.7 million.

Financing Activities

Net cash used in financing activities during the year ended December 31, 2022 was $12.5 million and consisted of debt principal repayments of $48.9 million, repurchases of common stock of $1.2 million, and payment of taxes on behalf of our employees related to net share settlement of equity awards of $2.1 million. These amounts were partially offset by net proceeds of $39.4 million received from the Securities Purchase Agreement, or SPA, with Verizon Ventures LLC on April 18, 2022, combined with the proceeds from the exercise of stock options of $0.3 million.

Commercial Mortgage Loan

In July 2015, we entered into an $8.0 million commercial mortgage loan agreement, which matured on July 1, 2020. On July 1, 2020, we paid in full the remaining $6.5 million in unpaid principal and accrued interest under the mortgage loan with funds drawn upon our revolving credit facility. The annual interest rate on the loan was 3.5%, and the loan was repayable in 60 monthly installments of principal and interest based on a 20-year amortization schedule. The loan was secured by the land and building, which are our corporate offices, purchased in March 2015.

Term Loan and Revolving Credit Facilities

On December 20, 2016, we entered into a credit agreement with JPMorgan Chase Bank, N.A., as administrative agent, various lenders and JPMorgan Chase Bank, N.A. and Barclays Bank PLC, as joint lead arrangers and joint bookrunners, providing for:

- a term loan facility, or the Term Loan, of $300.0 million; and
- a revolving credit facility of up to $25.0 million in revolving credit loans and letters of credit.

As of December 31, 2022 and 2021, we had borrowings of $226.0 million and $278.2 million, respectively, outstanding under the Term Loan. On December 20 2021, the revolving credit facility matured.

Because the Term Loan matures within one year and the Company does not currently have committed financing or available liquidity to meet such debt obligations if they were to become due in accordance with their current terms, there is substantial doubt about our ability to continue as a going concern. We continue to work with potential lenders to refinance the existing debt.

Borrowings under the Term Loan bear interest at a floating rate, which can be either a Eurodollar rate plus an applicable margin or, at our option, a base rate (defined as the highest of (x) the JPMorgan Chase, N.A. prime rate, (y) the federal funds effective rate, plus one-half percent (0.50%) per annum and (z) a one-month Eurodollar rate plus 1.00% per annum) plus an applicable margin. The applicable margin for borrowings under the Term Loan is 4.00% per annum for Eurodollar rate loans (subject to a 1.00% per annum interest rate floor) and 3.00% per annum for base rate loans. The interest rates payable under the Term Loan are subject to an increase of 2.00% per annum during the continuance of any payment default.

For Eurodollar rate loans, we may select interest periods of one, three or six months or, with the consent of all relevant affected lenders, twelve months. Interest will be payable at the end of the selected interest period, but no less frequently than every three months within the selected interest period. Interest on any base rate loan is not set for any specified period and is payable quarterly. We have the right to convert Eurodollar rate loans into base rate loans and the right to convert base rate loans into Eurodollar rate loans at our option, subject, in the case of Eurodollar rate loans, to breakage costs if the conversion is effected prior to the end of the applicable interest period. As of December 31, 2022, the interest rate on our borrowings under the Term Loan was 8.38% per annum, which was based on a one-month Eurodollar rate of 4.38% per annum plus the applicable margin of 4.00% per annum for Eurodollar rate loans. As of December 31, 2021, the interest rate on our Term Loan was 5.00% per annum, which was based on a one-month Eurodollar rate, at the applicable floor of 1.00% per annum plus the applicable margin of 4.00% per annum for Eurodollar rate loans.

The Term Loan matures on December 20, 2023. The Term Loan is subject to amortization in equal quarterly installments, which commenced on March 31, 2017, of principal in an annual aggregate amount equal to 1.0% of the original principal amount of the Term Loan of $300.0 million, with the remaining outstanding balance payable at the date of maturity.

Voluntary prepayments of principal amounts outstanding under the Term Loan are permitted at any time; however, if a prepayment of principal is made with respect to a Eurodollar loan on a date other than the last day of the applicable interest period, we are required to compensate the lenders for any funding losses and expenses incurred as a result of the prepayment.

In addition, we are required to make mandatory prepayments under the Term Loan with respect to (i) 100% of the net cash proceeds from certain asset dispositions (including casualty and condemnation events) by us or certain of our subsidiaries, subject to certain exceptions and reinvestment provisions, (ii) 100% of the net cash proceeds from the issuance or incurrence of any additional debt by us or certain of our subsidiaries, subject to certain exceptions, and (iii) 50% of our excess cash flow, as defined in the credit agreement, subject to reduction upon our achievement of specified performance targets. In accordance with these provisions, a mandatory prepayment of $6.8 million was paid on April 2, 2021. Based on results for the year ended December 31, 2022, no mandatory prepayment will be required in 2023.

The Term Loan is secured by, among other things, a first priority security interest, subject to permitted liens, in substantially all of our assets and all of the assets of certain of our subsidiaries and a pledge of certain of the stock of certain of our subsidiaries, in each case subject to specified exceptions. The Term Loan contains customary affirmative and negative covenants, including certain restrictions on our ability to pay dividends and repurchase outstanding shares. As of December 31, 2022 and 2021, we were in compliance with all applicable covenants of the Term Loan.

Tax Cuts and Jobs Act

Of our total cash and cash equivalents of $129.4 million as of December 31, 2022, $33.1 million was held by our foreign subsidiaries. The Tax Cuts and Jobs Act, or TCJA, established a modified territorial system requiring a mandatory deemed repatriation tax on undistributed earnings of foreign subsidiaries. As a result, applicable U.S. corporate income taxes have been provided on substantially all of our accumulated earnings of foreign subsidiaries. Beginning in 2018, the TCJA also required a minimum tax on certain future earnings generated by foreign subsidiaries while providing future tax-free repatriation of such earnings through a 100% dividends-received deduction.

Effective for taxable years beginning after January 1, 2018, taxpayers are subjected to the Global Intangible Low-Taxed Income, or GILTI, provisions. The GILTI provisions require us to currently recognize in U.S. taxable income, a deemed dividend inclusion of foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary's tangible assets. For the years ended December 31, 2022 and 2021 we recorded income tax charges of $0.7 million and $2.6 million, respectively, related to GILTI.

Securities Purchase Agreement with Verizon Ventures LLC

On April 18, 2022, we entered into a Stock Purchase Agreement, or SPA, with Verizon Ventures LLC providing for the private placement of an aggregate of 9.3 million shares of our common stock, par value $0.001 per share, at a price of $4.24 per share, for an aggregate purchase price of approximately $39.5 million. We filed a resale registration statement with the SEC on May 17, 2022, and intend to use the net proceeds from the private placement for general corporate purposes.

Stock Repurchase Program

On February 21, 2019, we announced a stock repurchase program under which we were authorized to repurchase up to $75.0 million of our common stock. During the years ended December 31, 2022 and 2021, we repurchased 0.2 million and 1.7 million shares of our common stock for approximately $1.2 million and $8.8 million, before commissions, respectively. As of December 31, 2022, approximately $60.2 million remained authorized for repurchases of our common stock under the stock repurchase program. However, based on our net leverage ratio at December 31, 2022, our ability to repurchase shares is currently restricted. The stock repurchase program has no expiration date, does not require us to purchase a minimum number of shares, and may be suspended, modified or discontinued at any time without prior notice.

Critical Accounting Policies and Significant Judgments and Estimates

Our management's discussion and analysis of financial condition and results of operations is based on our consolidated financial statements included elsewhere in this Annual Report on Form 10-K, which have been prepared in accordance with accounting principles generally accepted in the United States of America, or GAAP. In preparing our consolidated financial statements, we make estimates, assumptions and judgments that can have a significant effect on our reported revenue, results of operations and net income or loss, as well as on the value of certain assets and liabilities on our balance sheet during and as of the reporting periods. These estimates, assumptions and judgments are necessary because future events and their effects on our results and the value of our assets cannot be determined with certainty and are made based on our historical experience and on other assumptions that we believe to be reasonable under the circumstances. We evaluate our estimates and assumptions on an ongoing basis. These estimates may change as new events occur or additional information is obtained, and we may periodically be faced with uncertainties, the outcomes of which are not within our control and may not be known for a prolonged period of time. As the use of estimates is inherent in the financial reporting process, actual results could differ from those estimates.

While our significant accounting policies are described in more detail in Note 2, *Summary of Significant Accounting Policies,* to our accompanying consolidated financial statements included elsewhere in this Annual Report on Form 10-K, we believe that the following accounting policies are those most critical to the judgments and estimates used in the preparation of our consolidated financial statements.

Revenue Recognition

We generate revenue from sales of our products, including software, substantially all of which is pursuant to perpetual licenses, along with associated maintenance, support and extended hardware warranty services, and, to a lesser extent, from sales of professional services. Maintenance and support services include telephone support, bug fixes and unspecified software upgrades and updates provided on a when-and-if-available basis and/or extended hardware warranty.

In our consolidated statements of operations and comprehensive (loss) income, we classify revenue from sales of cable, wireless and fixed-line broadband products as product revenue, and revenue from maintenance and support and professional services as service revenue.

In accordance with ASC Topic 606, Revenue from Contracts with Customers, or ASC 606, we recognize revenue when a customer obtains control of promised products or services. The amount of revenue recognized reflects the consideration that we expect to be entitled to receive in exchange for these products or services. To achieve the core principle of this standard, we apply the following five steps:

1) Identify the contract with a customer – We consider binding contracts and/or purchase orders to be customer contracts, provided collection is probable. We assess collectability based on a number of factors that generally include information supplied by credit agencies, references and/or analysis of customer accounts and payment history. We combine contracts with customers if those contracts were negotiated as a single deal or contain price dependencies.

2) Identify the performance obligations in the contract – We identify performance obligations as products and services that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available from third parties or from us, and are distinct in the context of the contract, whereby the transfer of the products or services is separately identifiable from other promises in the contract.

3) Determine the transaction price – We determine the transaction price based on the consideration to which we expect to be entitled in exchange for transferring products or services to the customer. We include variable consideration in the transaction price if, in our judgment, it is probable that no significant future reversal of cumulative revenue under the contract will occur.

4) Allocate the transaction price to performance obligations in the contract – We allocate the transaction price to performance obligations based on a relative standalone selling price, or SSP.

5) Recognize revenue when or as we satisfy a performance obligation – We recognize revenue from product sales upon delivery to the customer, which is generally when control of the asset has passed to the customer. Support revenue is generally recognized over the contract period once the associated product's control has been passed to the customer. Finally, for professional services, we recognize revenue for the fee-based arrangements upon completion of the service and receipt of acceptance, if applicable.

Performance Obligations

The majority of our contracts with customers contain multiple performance obligations including products and maintenance services, and on a limited basis, professional services. For these contracts, we account for individual performance obligations separately if they are considered distinct. We consider our cable, wireless and fixed-line broadband products, maintenance services and professional services as distinct performance obligations. When multiple performance obligations exist in a customer contract, we allocate the transaction price to the separate performance obligations on a relative SSP basis. We determine SSP using our judgment and based on the best evidence available which may include the selling price of products when sold on a standalone basis to similar customers in similar circumstances, or in the absence of standalone sales, taking into consideration our historical pricing practices by customer type, selling method (i.e., resellers or direct), and geographic-specific market factors.

Product revenue

Some of our cable, wireless and fixed-line broadband products have both software and non-software (i.e., hardware) components that function together to deliver the products' essential functionality. In these instances, our hardware generally cannot be used apart from the embedded software and is considered one distinct performance obligation. We recognize revenue for both new and existing customers at a point in time when control of the products is transferred to the customer, which is typically when title and risk of loss have transferred and the right to payment is enforceable. We also earn revenue from the sale of perpetual software licenses and/or software-enabled capacity expansions. Revenue on perpetual software licenses and software-enabled capacity expansions for existing customers are also distinct performance obligations as they are separately identifiable and provide additional bandwidth capacity on hardware products already purchased by the customer. We recognize revenue on perpetual software licenses and software-enabled capacity expansions when control is transferred, which is typically as the software entitlements are made available to the customer.

When customer contracts require acceptance of product and services, we consider the nature of the acceptance provisions to determine if they are substantive or considered perfunctory to determine if these acceptance provision impact the timing of revenue recognition. When acceptance provisions are considered substantive, we will defer revenue on all performance

obligations in the contract subject to acceptance until acceptance has been received. We do not defer revenue when acceptance provisions are deemed perfunctory.

Maintenance and Support Services and Professional Services Revenue

Other than for certain of our CPE products, we generally sell our products with maintenance and support services, a distinct performance obligation that includes the stand-ready obligation to provide telephone support, bug fixes and unspecified software upgrades and updates provided on a when-and-if-available basis and/or extended hardware warranty. After the initial sale, customers may purchase annual renewals of support contracts. Our telephone support and unspecified upgrades and updates are delivered over time and we therefore recognize revenue ratably over the contract term, which is typically one year, but can be as long as five years. We also generate revenue from sales of professional services, such as installation, configuration and training. Professional services are a distinct performance obligation since our products are functional without these services and can generally be performed by the customer or a third party. We generally recognize fee-based professional services delivered at a point in time as the professional services are completed and upon receipt of acceptance if applicable.

The sale of our products generally includes a 90-day warranty on the software and a one-year warranty on the hardware component of the products, which includes repair or replacement of the applicable hardware. We include these warranties to ensure the products perform in accordance with our specifications and are therefore not a performance obligation. We record a warranty accrual for the initial software and hardware warranty included with product sales and do not defer revenue.

Resellers and Sales Agents

We market and sell our products through our direct global sales force, supported by sales agents, and through resellers. Our resellers receive an order from an end customer prior to placing an order with us, and we confirm the identification or are aware of the end customer prior to accepting such order. We invoice the reseller an amount that reflects a reseller discount and record revenue based on the amount of the discounted transaction value. Aside from wireless and fixed-line broadband hardware products, our resellers do not stock inventory received from us.

When we transact with a reseller, the contract is with the reseller and not with the end customer. Whether we transact business with and receive the order from a reseller or directly from an end customer, our revenue recognition policy and resulting pattern of revenue recognition for the order are the same.

We have assessed whether we are the principal (i.e., reports revenue on a gross basis) or agent (i.e., reports revenue on a net basis) by evaluating whether we have control of the good or service before it is transferred to the customer. As we control the promised good or service before transferring it to the customer, we act as the principal in the transaction. Accordingly, we report revenue on a gross basis.

We also use sales agents that assist in the sales process with certain customers primarily located in the Latin America and Asia-Pacific regions. Sales agents are not resellers. If a sales agent is engaged in the sales process, we receive the order directly from and sell the products and services directly to the end customer, and we pay a commission to the sales agent, calculated as a percentage of the related transaction value. Accounting considerations related to sales agent commissions are discussed in the “Costs to Obtain or Fulfill a Contract” section below.

Costs to Obtain or Fulfill a Contract

We capitalize commission expenses paid to internal sales personnel and sales agent commissions that are incremental to obtaining customer contracts, for which we recognize the related revenue over a future period greater than 12 months. We incur these costs on initial sales of product, professional services and maintenance and support contract renewals. We defer these costs and amortize them over the period of benefit, which we generally consider to be the contract term or length of the longest delivery period as contract capitalization costs in the consolidated balance sheets. We elected to use the practical expedient, allowing us to recognize the incremental costs of obtaining a contract as an expense when incurred if the amortization period would have been one year or less.

Commissions paid relating to maintenance and support contract renewals of twelve months or less are expensed as incurred as commissions paid on renewals are commensurate with commissions paid on initial sales transactions. Costs to obtain a contract for professional services contracts are expensed as incurred in accordance with the practical expedient as the contractual period of our professional services contracts are one year or less. We periodically review the carrying amount of capitalized contract costs to determine whether events or changes in circumstances have occurred that could impact the period of benefit.

Deferred Revenue

We record amounts billed in excess of revenue recognized as deferred revenue. Deferred revenue includes customer deposits, amounts billed for maintenance and support services contracts in advance of services being performed, amounts for trade-in right liabilities and amounts related to contracts that have been deferred as a result of not meeting the required revenue recognition criteria as of the end of the reporting period. We report deferred revenue expected to be recognized as revenue more than one year subsequent to the balance sheet date within long-term liabilities in the consolidated balance sheets.

We defer recognition of direct costs, such as cost of goods and services, until recognition of the related revenue. We classify such costs as current assets if the related deferred revenue is classified as current and as non-current assets if the related deferred revenue is classified as non-current.

Other Revenue Recognition Policies

Our customary payment terms are generally 90 days or less. We have elected to apply the practical expedient that allows an entity to not adjust the promised amount of consideration in customer contracts for the effect of a significant financing component when the period between the transfer of product and services and payment of the related consideration is less than one year. If we provide extended payment terms that represent a significant financing component, we adjust the amount of promised consideration for the time value of money using an appropriate discount rate and recognize interest income separate from the revenue recognized on contracts with customers.

In limited instances, we have offered future rebates to customers based on a fixed or variable percentage of actual sales volumes over specified periods. The future rebates earned based on the customer's purchasing from us in one period may be used as credits to be applied by them against accounts receivable due to the Company in later periods. We account for these future rebates as variable consideration and reduce the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized will occur when the variable consideration is resolved. We estimate the reduction of the transaction price based on historical activity and other relevant factors and recognize it when we recognize revenue for the transfer of goods and services to the customer on which the future rebate was earned. Other forms of contingent revenue or variable consideration are infrequent.

We exclude any taxes assessed by a governmental authority that are directly imposed on a revenue-producing transaction (e.g., sales, use and value added taxes) from our transaction price.

We record billings to customers for reimbursement of out-of-pocket expenses, including travel, lodging and meals as revenue, and we record the associated costs incurred by us for those items as cost of revenue. We account for revenue related to the reimbursement of out-of-pocket costs as variable consideration.

We account for any shipping and handling activities as a fulfillment cost rather than an additional promised service. We record shipping and handling billed to customers as an offset to cost of revenue.

Inventories

We value inventories at the lower of cost or net realizable value. We compute cost using the first-in first-out convention. Inventories are composed of hardware and related component parts of finished goods. We establish provisions for excess and obsolete inventories after evaluating historical sales, future demand, market conditions, expected product life cycles, and current inventory levels to reduce such inventories to their estimated net realizable value. We make such provisions in the normal course of business and charge them to cost of revenue in our consolidated statements of operations and comprehensive (loss) income.

We include deferred inventory costs within inventory in our consolidated balance sheets. Deferred inventory costs represent the cost of products that have been delivered to the customer for which revenue associated with the arrangement has been deferred as a result of not meeting all of the required revenue recognition criteria, such as receipt of customer acceptance. We recognize deferred inventory costs as cost of revenue in our consolidated statements of operations and comprehensive (loss) income when the related revenue is recognized.

Goodwill and Intangible Assets

Goodwill represents the excess purchase price over the estimated fair value of net assets acquired as of the acquisition date. We test goodwill for impairment on an annual basis and between annual tests when impairment indicators are identified,

and goodwill is written down when impaired. We recognized goodwill in connection with the acquisition of NetComm on July 1, 2019.

We perform our annual goodwill impairment test during the fourth quarter. For our annual goodwill impairment test, we operate under one reporting unit and the fair value of our reporting unit has been determined based on our enterprise value. As part of the annual goodwill impairment test, we have the option to perform a qualitative assessment to determine whether further impairment testing is necessary. Examples of events and circumstances that might indicate that the reporting unit's fair value is less than its carrying amount include macro-economic conditions such as deterioration in the entity's operating environment or industry or market considerations; entity-specific events such as increasing costs, declining financial performance, or loss of key personnel; or other events such as a sustained decrease in the stock price on either an absolute basis or relative to peers. If, as a result of our qualitative assessment, we determine that it is more likely than not (i.e., greater than 50% chance) that the fair value of our reporting unit is less than our carrying amount, the quantitative impairment test will be required. Otherwise, no further testing will be required. We completed our qualitative assessment and concluded that as of December 31, 2022, it is not more likely than not that the fair value of our reporting unit is less than our carrying amount.

We amortize our acquired intangible assets subject to amortization using the straight-line method over their estimated useful lives, ranging from three to ten years. Purchased software licenses are classified as intangible assets and are amortized using the straight-line method over their estimated useful lives, typically ranging from three to four years. We evaluate the recoverability of intangible assets periodically, by taking into account events or circumstances that may warrant revised estimates of useful lives or that indicate the asset may be impaired. We considered potential impairment indicators of acquired intangible assets at December 31, 2022 and identified one potential indicator of impairment due to the loss of a certain Tier 1 customer related to the customer relationships intangible asset class, which caused a significant underperformance of the business in relation to expectations. This triggered management to perform a quantitative analysis, the result of which did not indicate an impairment. There were no other indicators of impairment as of December 31, 2022.

Product Warranties

Substantially all of our products are covered by a warranty for software and hardware for periods ranging from 90 days to two years. In addition, in conjunction with customers' renewals of maintenance and support contracts, we offer an extended warranty for periods typically of one to three years for agreed-upon fees. In the event of a failure of a hardware product or software covered by these warranties, we must repair or replace the software or hardware or, if those remedies are insufficient, provide a refund at our discretion. Our warranty reserve, which is included in accrued expenses and other current liabilities in our consolidated balance sheets, reflects estimated material, labor and other costs related to potential or actual software and hardware warranty claims for which we expect to incur an obligation. We base our estimates of anticipated rates of warranty claims and the costs associated therewith primarily on historical information and future forecasts. We periodically assess the adequacy of the warranty reserve and adjust the amount as necessary. If the historical data used to calculate the adequacy of the warranty reserve are not indicative of future requirements, additional or reduced warranty reserves may be required.

Income Taxes

We account for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial statement and tax basis of assets and liabilities, as measured by enacted tax rates anticipated to be in effect when these differences reverse. This method also requires the recognition of future tax benefits to the extent that realization of such benefits is more likely than not. Deferred tax expense or benefit is the result of changes in the deferred tax assets and liabilities. We assess the likelihood that our deferred tax assets will be recovered from future taxable income and, to the extent we believe, based upon the weight of available evidence, that it is more likely than not that all or a portion of the deferred tax assets will not be realized, we establish a valuation allowance through a charge to income tax expense. We evaluate the potential for recovery of deferred tax assets by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies. As of December 31, 2022, we determined that it is more likely than not that our worldwide net deferred tax assets will not be realized, and thus maintain a valuation allowance against our worldwide net deferred tax assets (see Note 9, Income Taxes, to our accompanying financial statements).

We record a liability for potential payments of taxes to various tax authorities related to uncertain tax positions and other tax matters. We base the recorded liability on a determination of whether and how much of a tax benefit in our tax filings or positions is more likely than not to be realized. The amount of the benefit that may be recognized in the financial statements is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. To the extent that the assessment of such tax positions changes, we record the change in estimate in the period in which the determination is made. We establish a liability, which is included in long-term accrued income taxes in our consolidated balance sheets, for tax-related

uncertainties based on estimates of whether, and the extent to which, additional taxes will be due. These liabilities are established when we believe that certain positions might be challenged despite our belief that the tax return positions are fully supportable. We adjust the recorded liability in light of changing facts and circumstances. Our provision for income taxes includes the impact of the recorded liability and changes thereto.

We recognize interest and penalties related to uncertain tax positions within other income (expense) in our consolidated statements of operations and comprehensive (loss) income. We include accrued interest and penalties in long-term accrued income taxes in our consolidated balance sheets.

For taxable years beginning after January 1, 2018, taxpayers are subjected to the GILTI provisions. The GILTI provisions require us to currently recognize in U.S. taxable income a deemed dividend inclusion of foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary's tangible assets. The ability to benefit from a deduction and foreign tax credits against a portion of the GILTI income may be limited under the GILTI rules as a result of the utilization of net operating losses, foreign sourced income, and other potential limitations within the foreign tax credit calculation. During the years ended December 31, 2022, 2021 and 2020, we recorded an income tax charge of $0.7 million, $2.6 million, and $3.5 million, respectively, related to GILTI. We have made an accounting policy election to recognize the impacts of GILTI within the period incurred. Therefore, no U.S. deferred taxes are provided on GILTI inclusions of future foreign subsidiary earnings.

Stock-Based Compensation

We measure stock options and other stock-based awards granted to employees and directors based on the fair value on the date of the grant and recognize compensation expense of those awards, net of estimated forfeitures, over the requisite service period, which is generally the vesting period of the respective award. Generally, we issue stock options with only service-based vesting conditions and record the expense for these awards using the straight-line method.

We classify stock-based compensation expense in our consolidated statements of operations and comprehensive (loss) income in the same manner in which the award recipient's payroll costs are classified or in which the award recipient's service payments are classified.

We recognize compensation expense for only the portion of awards that are expected to vest. In developing a forfeiture rate estimate, we have considered our historical experience to estimate pre-vesting forfeitures for service-based awards. The impact of a forfeiture rate adjustment will be recognized in full in the period of adjustment, and if the actual forfeiture rate is materially different from our estimate, we may be required to record adjustments to stock-based compensation expense in future periods.

We estimate the fair value of each stock option grant on the date of grant using the Black-Scholes option pricing model. We were a private company until December 14, 2017 and lack sufficient company-specific historical and implied volatility information for our stock. Therefore, for all option granted in 2020 or before, we estimated our expected stock volatility based on the historical volatility of publicly traded peer companies. Beginning with options granted in 2021, we have estimated our expected stock volatility using a weighted-average calculation based on the historical volatility of the Company and publicly traded peer companies and expect to continue to do so until such time as we have adequate historical data regarding the volatility of our own traded stock price. The expected term of our stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla" options. The expected term of stock options granted to non-employees is equal to the contractual term of the option award. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that we do not have a history of declaring or paying cash dividends, except for the special cash dividends declared in November 2014, June 2016, December 2016, May 2017 and November 2017 and in those circumstances the board of directors approved cash dividends to be paid to holders of our stock options, stock appreciation rights and restricted stock units upon vesting as an equitable adjustment to the holders of such instruments.

We have also granted SARs to certain employees, which require us to pay in cash upon exercise an amount equal to the product of the excess of the per share fair market value of our common stock on the date of exercise over the exercise price, multiplied by the number of shares of common stock with respect to which the SAR is exercised. Because these awards may require us to settle the awards in cash, we account for them as a liability in our consolidated balance sheets. We recognize the liability related to these awards, as well as related compensation expense over the period during which services are rendered until completed. We estimate changes in the fair value of the SAR liability using the Black-Scholes option pricing model and record them in our consolidated statements of operations and comprehensive (loss) income. After vesting is completed, we will

continue to remeasure the fair market value of the liability until the award is either exercised or canceled, with changes in the fair value of the liability recorded in our consolidated statements of operations and comprehensive (loss) income.

Emerging Growth Company Status

The Jumpstart Our Business Startups Act of 2012, or the JOBS Act, provides that an "emerging growth company" can take advantage of the extended transition period afforded by the JOBS Act for the implementation of new or revised accounting standards. Prior to December 31, 2022, we were an emerging growth company and elected not to "opt out" of such extended transition period, which means that when a standard was issued or revised and it had different application dates for public or private companies, we adopted the new or revised standard at the time private companies adopted the new or revised standard. As of December 31, 2022, we no longer qualified as an emerging growth company and will adopt any future accounting standards at the time other public companies adopt the standard.

Recent Accounting Pronouncements

Refer to the "Summary of Significant Accounting Policies" footnote within our consolidated financial statements included elsewhere in this Annual Report on Form 10-K for our analysis of recent accounting pronouncements that are applicable to our business.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Market risk is the risk of loss to future earnings, values or cash flows that may result from changes in the price of a financial instrument. The value of a financial instrument may change as a result of changes in interest rates, exchange rates, commodity prices, equity prices and other market changes. We are exposed to market risk related to changes in foreign currency exchange rates and interest rates. We do not use derivative financial instruments for speculative or trading purposes. However, we have entered into, and in the future expect to continue to enter into, exchange rate hedging arrangements to manage certain of the risks described below.

Foreign Currency Exchange Risk

We have accounts receivables denominated in foreign currencies, and our operations outside of the United States incur their operating expenses in foreign currencies. To date, the majority of our product sales and inventory purchases have been denominated in U.S. dollars. For our subsidiaries in Ireland and Australia, the U.S. dollar is the functional currency. For each of our other foreign subsidiaries, the functional currency is the local currency. During the years ended December 31, 2022, 2021 and 2020, we incurred foreign currency transaction gains (losses) of $1.7 million, $(2.1) million, and $0.5 million, respectively, primarily related to unrealized and realized foreign currency gains for accounts receivable denominated in foreign currencies and operating expenses that are denominated in local currencies. We recorded these foreign currency transaction gains (losses) as a component of other income (expense), net in our consolidated statements of operations and comprehensive (loss) income. We believe that a 10% change in the exchange rate between either the U.S. dollar and Euro or the U.S. dollar and Australian dollar would not materially impact our operating results or financial position.

Our foreign currency risk management practices are principally intended to mitigate the potential financial impact of changes in the value of transactions and balances denominated in foreign currencies resulting from changes in foreign currency exchange rates. From time to time we enter into cash flow hedges, which utilize foreign currency forward contracts to hedge specific forecasted transactions of our foreign subsidiaries with the goal of protecting our budgeted revenue and expenses against foreign currency exchange rate changes compared to our budgeted rates. During the year ended December 31, 2020, we settled two cash flow hedges which we used to hedge specific operating cash flows denominated in Australian dollars. There were no cash flow hedges outstanding as of December 31, 2022 and 2021.

The success of our foreign currency risk management depends upon forecasts of transaction activity denominated in various currencies. To the extent that these forecasts are overstated or understated during periods of currency volatility, we could experience unanticipated foreign currency gains or losses that could have a material impact on our results of operations. Furthermore, our failure to identify new exposures and hedge them in an effective manner may result in material foreign currency gains or losses.

Interest Rate Sensitivity

Our cash and cash equivalents as of December 31, 2022 consisted of cash maintained in FDIC-insured operating accounts as well as investments in money market mutual funds and certificates of deposit. We also have policies requiring us to invest in high-quality issuers, limit our exposure to any individual issuer, and ensure adequate liquidity. Our primary exposure to market risk for our cash and cash equivalents is interest income sensitivity, which is primarily affected by changes in the general level of U.S. interest rates. However, we do not believe a sudden change in the interest rates for our cash and cash equivalents would have a material impact on our financial condition, results of operations or cash flows.

We have a credit agreement that provides us with a term loan facility of $300.0 million. Borrowings under the facility bear interest at a floating rate, which can be either a Eurodollar rate plus an applicable margin or, at our option, a base rate (defined as the highest of (x) the JPMorgan Chase, N.A. prime rate, (y) the federal funds effective rate, plus one-half percent (0.50%) per annum and (z) a one-month Eurodollar rate plus 1.00% per annum) plus an applicable margin. The applicable margin for borrowings under the term loan facility is 4.00% per annum for Eurodollar rate loans (subject to a 1.00% per annum interest rate floor) and 3.00% per annum for base rate loans.

As of December 31, 2022, we had borrowings of $226.0 million outstanding under the term loan facility, bearing interest at a rate of 8.38% per annum, which was based on a one-month Eurodollar rate of 4.38% per annum plus the applicable margin of 4.00% per annum for Eurodollar rate loans. Changes in interest rates could cause interest charges on our term loan facility to fluctuate. Based on the amount of borrowings outstanding as of December 31, 2022, an increase or decrease of 10% in the Eurodollar rate as of December 31, 2022 would cause a pre-tax decrease and increase, respectively, to our earnings and cash flows of approximately $1.0 million per year, assuming such rate were to remain in effect for one year.

Inflation Risk

We have experienced a significant increase in the costs of components and subcontract manufacturing of our products, as well as increased operating expenses as a result of recent increases in inflation, which we were not able to fully recover through price increases to our customers. While it is not possible to measure or estimate the direct impact, continued periods of high inflation would have a material adverse effect on our business, operating results and financial condition.

Item 8. Financial Statements and Supplementary Data.

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Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Casa Systems, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Casa Systems, Inc. (the Company) as of December 31, 2022 and 2021, the related consolidated statements of operations and comprehensive (loss) income, stockholders' equity and cash flows for each of the three 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 three 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 15, 2023 expressed an adverse opinion thereon.

The Company's Ability to Continue as a Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the consolidated financial statements, the Company has insufficient financial resources to meet its obligation related to debt maturing in 2023 and has stated that substantial doubt exists about the Company's ability to continue as a going concern. Management's evaluation of the events and conditions and management's plans regarding these matters are also described in Note 1. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Adoption of ASU No. 2016-02

As discussed in Note 2 to the consolidated financial statements, the Company changed its method of accounting for leases in the year ended December 31, 2022 due to the adoption of Accounting Standards Update (ASU) No. 2016-02, *Leases (Topic 842)*, and the related amendments.

Basis for Opinion

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

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included

evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the critical audit matter 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 matter below, providing a separate opinion on the critical audit matter or on the account or disclosure to which it relates.

	Estimate of Excess and Obsolete Inventories
Description of the Matter	The Company's inventories totaled $81.8 million, net, as of December 31, 2022. As described in Note 2 to the consolidated financial statements, the Company records a provision for estimated excess and obsolete inventories. Management determines the provision after evaluating historical sales, future demand, market conditions, expected product life cycles, and current inventory levels to reduce such inventories to their estimated net realizable value. Auditing the Company's provision for excess and obsolete inventories was challenging due to the highly judgmental nature of the factors used to estimate the provision. Specifically, the Company's estimates may be significantly affected by management's assumptions of future demand, expected product life cycles and market conditions.
How We Addressed the Matter in Our Audit	To test the adequacy of the Company's provision for excess and obsolete inventories, our audit procedures included, among others, evaluating the significant assumptions stated above and testing the accuracy and completeness of the underlying data used by management to determine the excess and obsolete inventories provision. We compared the quantities of on-hand inventories to historical and forecasted demand and considered the impact of product life cycles on the excess inventory estimates. In addition, we compared management's assumptions regarding market conditions to trends in the industry. We also performed sensitivity analyses to evaluate the impact to the excess and obsolete inventories provision that would result from changes in the underlying assumptions.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2020.

Boston, Massachusetts
March 15, 2023

CASA SYSTEMS, INC.
CONSOLIDATED BALANCE SHEETS
(Amounts in thousands, except per share amounts)

	December 31, 2022	December 31, 2021
Assets		
Current assets:		
Cash and cash equivalents	$ 126,312	$ 154,703
Accounts receivable, net of provision for doubtful accounts of $636 and $117 as of December 31, 2022 and 2021, respectively[1]	74,484	85,774
Inventory	81,795	84,828
Prepaid expenses and other current assets	2,836	5,746
Prepaid income taxes	6,352	23,963
Total current assets	291,779	355,014
Property and equipment, net	19,518	23,508
Right-of-use assets	5,199	—
Accounts receivable, net of current portion	—	115
Deferred tax assets	—	101
Goodwill	50,177	50,177
Intangible assets, net	25,759	31,144
Other assets	5,862	8,648
Total assets	$ 398,294	$ 468,707
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	$ 29,283	$ 28,087
Accrued expenses and other current liabilities	31,825	41,382
Accrued income taxes	4,298	4,991
Deferred revenue[2]	31,305	14,473
Lease liability	2,040	—
Current portion of long-term debt, net of unamortized debt issuance costs	225,161	1,924
Total current liabilities	323,912	90,857
Accrued income taxes, net of current portion	6,640	7,732
Deferred tax liabilities	1,490	5,293
Deferred revenue, net of current portion	5,529	7,012
Lease liability, long-term	3,416	—
Long-term debt, net of current portion and unamortized debt issuance costs	—	274,193
Other non-current liabilities	7,906	1,701
Total liabilities	348,893	386,788
Commitments and contingencies (Note 18)		
Stockholders' equity:		
Preferred stock, $0.001 par value; 5,000 shares authorized; no shares issued and outstanding	—	—
Common stock, $0.001 par value; 500,000 shares authorized; 98,262 and 87,815 shares issued as of December 31, 2022 and 2021, respectively; 94,665 and 84,422 shares outstanding as of December 31, 2022 and 2021, respectively	98	88
Treasury stock, at cost; 3,597 and 3,393 shares at December 31, 2022 and 2021, respectively	(14,837)	(13,645)
Additional paid-in capital	244,675	193,654
Accumulated other comprehensive (loss) income	(2,305)	878
Accumulated deficit	(178,230)	(99,056)
Total stockholders' equity	49,401	81,919
Total liabilities and stockholders' equity	$ 398,294	$ 468,707

[1] Includes accounts receivable due from a related party of $6,044 at December 31, 2022 (see Note 16, *Related Parties*)
[2] Includes deferred revenue associated with a related party of $18,094 at December 31, 2022 (see Note 16, *Related Parties*)

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

CASA SYSTEMS, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE (LOSS) INCOME
(Amounts in thousands, except per share amounts)

	Year Ended December 31,		
	2022	2021	2020
Revenue:			
Product	$ 237,547	$ 353,942	$ 346,083
Service	48,990	47,383	47,163
Total revenue[1]	286,537	401,325	393,246
Cost of revenue:			
Product	164,988	208,451	187,706
Service	5,080	4,694	4,941
Warranty settlement provision	12,803	—	—
Total cost of revenue	182,871	213,145	192,647
Gross profit	103,666	188,180	200,599
Operating expenses:			
Research and development	85,243	84,362	84,370
Selling, general and administrative	86,903	85,563	92,016
Total operating expenses	172,146	169,925	176,386
(Loss) income from operations	(68,480)	18,255	24,213
Other income (expense):			
Interest income	2,300	362	999
Interest expense	(17,620)	(14,958)	(16,895)
Gain on extinguishment of debt	2,728	—	—
Gain (loss) on foreign currency, net	1,730	(2,113)	452
Other income, net	752	1,948	980
Total other expense, net	(10,110)	(14,761)	(14,464)
(Loss) income before provision for (benefit from) income taxes	(78,590)	3,494	9,749
Provision for (benefit from) income taxes	615	287	(15,052)
Net (loss) income	(79,205)	3,207	24,801
Other comprehensive (loss) income—foreign currency translation adjustment, net of tax	(3,183)	541	2,559
Comprehensive (loss) income	$ (82,388)	$ 3,748	$ 27,360
Net (loss) income per share attributable to common stockholders:			
Basic	$ (0.86)	$ 0.04	$ 0.30
Diluted	$ (0.86)	$ 0.04	$ 0.29
Weighted-average number of shares used to compute net (loss) income per share attributable to common stockholders:			
Basic	91,596	85,253	83,465
Diluted	91,596	88,857	85,278

[1] Includes revenue of $18,004 during which a related party relationship existed during the year ended December 31, 2022 (see Note 16, *Related Parties*)

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

CASA SYSTEMS, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(Amounts in thousands, except per share amounts)

	Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Other Comprehensive (Loss) Income	Accumulated Deficit	Total Stockholders' Equity
	Shares	Amount	Shares	Amount				
Balances at December 31, 2019	84,333	$ 84	495	$ (1,795)	$ 169,561	$ (2,222)	$ (127,064)	$ 38,564
Exercise of stock options and common stock issued upon vesting of equity awards, net of shares withheld for employee taxes	996	1	—	—	554	—	—	555
Foreign currency translation adjustment, net of tax of ($49)	—	—	—	—	—	2,559	—	2,559
Repurchases of treasury shares	—	—	1,227	(3,031)	—	—	—	(3,031)
Stock-based compensation	—	—	—	—	12,926	—	—	12,926
Net income	—	—	—	—	—	—	24,801	24,801
Balances at December 31, 2020	85,329	85	1,722	(4,826)	183,041	337	(102,263)	76,374
Exercise of stock options and common stock issued upon vesting of equity awards, net of shares withheld for employee taxes	2,486	3	—	—	(4,206)	—	—	(4,203)
Foreign currency translation adjustment, net of tax of $0	—	—	—	—	—	541	—	541
Repurchases of treasury shares	—	—	1,671	(8,819)	—	—	—	(8,819)
Stock-based compensation	—	—	—	—	14,819	—	—	14,819
Net income	—	—	—	—	—	—	3,207	3,207
Balances at December 31, 2021	87,815	88	3,393	(13,645)	193,654	878	(99,056)	81,919
Exercise of stock options and common stock issued upon vesting of equity awards, net of shares withheld for employee taxes	1,124	1	—	—	(1,780)	—	—	(1,779)
Foreign currency translation adjustment, net of tax of $0	—	—	—	—	—	(3,183)	31	(3,152)
Repurchases of treasury shares	—	—	204	(1,192)	—	—	—	(1,192)
Sale of common stock, net of issuance costs	9,323	9	—	—	39,361	—	—	39,370
Stock-based compensation	—	—	—	—	13,440	—	—	13,440
Net loss	—	—	—	—	—	—	(79,205)	(79,205)
Balances at December 31, 2022	98,262	$ 98	3,597	$ (14,837)	$ 244,675	$ (2,305)	$ (178,230)	$ 49,401

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

CASA SYSTEMS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(Amounts in thousands)

	Year Ended December 31,		
	2022	2021	2020
Operating activities:			
Net (loss) income	$ (79,205)	$ 3,207	$ 24,801
Adjustments to reconcile net (loss) income to net cash (used in) provided by operating activities:			
Depreciation and amortization	13,373	15,680	17,970
Stock-based compensation	13,281	14,819	13,155
Deferred income taxes	(3,702)	(931)	(2,526)
Change in provision for excess and obsolete inventory	17,245	2,070	1,616
Change in provision for doubtful accounts	519	59	38
Gain on disposal of assets	275	37	115
Non-cash operating lease expense	2,370	—	—
Gain on extinguishment of debt	(2,728)	—	—
Changes in operating assets and liabilities:			
Accounts receivable	10,522	8,186	(350)
Inventory	(14,419)	14,101	(9,774)
Prepaid expenses and other assets	5,658	(2,017)	2,837
Prepaid income taxes	17,618	(9,884)	(11,745)
Accounts payable	1,978	(12,046)	17,015
Accrued expenses and other current liabilities	(2,677)	2,148	6,254
Operating lease liabilities	(2,366)	—	—
Accrued income taxes	(1,786)	(4,240)	5,297
Deferred revenue	15,410	2,409	(11,061)
Net cash (used in) provided by operating activities	(8,634)	33,598	53,642
Investing activities:			
Purchases of property and equipment	(3,705)	(3,887)	(5,153)
Purchases of software licenses	(714)	(1,439)	(432)
Net cash used in investing activities	(4,419)	(5,326)	(5,585)
Financing activities:			
Principal repayments of debt	(48,878)	(16,275)	(9,644)
Borrowings on revolving credit facility	—	—	6,500
Proceeds from exercise of stock options	327	2,262	1,195
Employee taxes paid related to net share settlement of equity awards	(2,106)	(6,465)	(640)
Proceeds from sale of common stock, net of issuance costs	39,370	—	—
Payments of dividends and equitable adjustments	(1)	(98)	(683)
Repurchases of common stock	(1,192)	(8,819)	(3,031)
Net cash used in financing activities	(12,480)	(29,395)	(6,303)
Effect of exchange rate changes on cash and cash equivalents	(2,846)	466	2,050
Net (decrease) increase in cash, cash equivalents and restricted cash	(28,379)	(657)	43,804
Cash, cash equivalents and restricted cash at beginning of year	157,804	158,461	114,657
Cash, cash equivalents and restricted cash at end of year [1]	$ 129,425	$ 157,804	$ 158,461
Supplemental disclosures of cash flow information:			
Cash paid for interest	$ 16,134	$ 16,944	$ 12,917
Cash paid for income taxes	$ 7,911	$ 10,194	$ 2,969
Supplemental disclosures of non-cash investing and financing activities:			
Purchases of property and equipment included in accounts payable	$ 90	$ 200	$ 128

[1] See Note 2, *Summary of Significant Accounting Policies*, for a reconciliation of the ending balance of cash, cash equivalents and restricted cash shown in these consolidated statements of cash flows.

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

CASA SYSTEMS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(Amounts in thousands, except per share amounts)

1. Nature of Business and Basis of Presentation

Casa Systems, Inc. (the "Company") was incorporated under the laws of the State of Delaware on February 28, 2003. The Company is a global communications technology company headquartered in Andover, Massachusetts and has wholly owned subsidiaries in China, France, Canada, Ireland, Spain, the Netherlands, Hong Kong, Australia, Germany, the United Kingdom and New Zealand.

The Company offers physical, virtual and cloud-native 5G broadband and customer premise networking equipment solutions, or CPE, to help communications service providers, or CSPs, transform and expand their public and private high-speed data and multi-service communications networks so they can meet the growing demand for bandwidth and new services. The Company's core and edge broadband technology enables CSPs and enterprises to cost-effectively and dynamically increase data network speed, add bandwidth capacity and new services, reduce network complexity and reduce operating and capital expenditures regardless of access technology.

The Company is subject to a number of risks similar to other companies of comparable size and other companies selling and providing services to the CSP industry. These risks include, but are not limited to, the level of capital spending by CSPs, a lengthy sales cycle, dependence on the development of new products and services, unfavorable economic and market conditions, competition from larger and more established companies, limited management resources, dependence on a limited number of contract manufacturers and suppliers, the rapidly changing nature of the technology used by CSPs, and reliance on resellers and sales agents. Failure by the Company to anticipate or to respond adequately to technological developments in its industry, changes in customer or supplier requirements, changes in regulatory requirements or industry standards, or any significant delays in the development or introduction of products could have a material adverse effect on the Company's operating results, financial condition and cash flows.

Prior to December 31, 2022, the Company was an "emerging growth company," as defined in the Jumpstart Our Business Startups Act of 2012 (the "JOBS Act"). The JOBS Act provided that an emerging growth company can take advantage of the extended transition period afforded by the JOBS Act for the implementation of new or revised accounting standards. The Company elected not to "opt out" of such extended transition period, which means that when a standard was issued or revised and it had different application dates for public or private companies, the Company was required to adopt the new or revised standard at or prior to the time private companies were required to adopt the new or revised standard. As of December 31, 2022, the Company no longer qualifies as an emerging growth company and will now be required to adopt new or revised standards at the same time as other public companies.

The accompanying consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America, or GAAP, and include the accounts and results of operations of the Company and its wholly owned subsidiaries. All intercompany transactions and balances have been eliminated in consolidation.

Going Concern

In accordance with the accounting guidance related to the presentation of financial statements, when preparing financial statements for each annual and interim reporting period, management evaluates whether there are conditions or events that, when considered in the aggregate, raise substantial doubt about the Company's ability to continue as a going concern within one year after the date that the financial statements are issued. In making its assessment, management considered the Company's current financial condition and liquidity sources including current funds available, forecasted future cash flows and condition and unconditional obligations due over the next twelve months.

As described further in Note 10, *Debt*, the Company has debt outstanding that matures within one year. The Company currently does not have committed financing or available liquidity to meet such debt obligations if they were to become due in accordance with their current terms. The Company has engaged an advisory investment banking firm to refinance the Term Loan, and also continues to work with its current lenders in order to refinance the outstanding debt. The Company has incurred and expects to continue to incur significant legal and advisory fees in developing its financing plans. There can be no assurance that the Company will be able to refinance its outstanding debt on acceptable terms, if at all. Because of the uncertainty in refinancing outstanding debt, management concluded that substantial doubt exists with respect to the Company's ability to continue as a going concern within one year after the date that these consolidated financial statements are issued.

The accompanying consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and satisfaction of liabilities in the ordinary course of business. The consolidated financial statements do not include any adjustments relating to the recoverability and classification of recorded asset amounts or the amounts and classification of liabilities that might result from the outcome of this uncertainty.

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting periods.

Significant estimates and judgments relied upon by management in preparing these consolidated financial statements include revenue recognition, reserves for excess and obsolete inventory, valuation of inventory and deferred inventory costs, the expensing and capitalization of software-related research and development costs, amortization and depreciation periods, the recoverability of net deferred tax assets, valuations of uncertain tax positions, warranty allowances, the valuation of equity instruments and stock-based compensation expense.

Although the Company regularly reassesses the assumptions underlying these estimates, actual results could differ materially from these estimates. Changes in estimates are recorded in the period in which they become known. The Company bases its estimates on historical experience and various other assumptions that it believes to be reasonable under the circumstances existing at the time such estimates are made.

The COVID-19 pandemic disrupted the Company’s global supply chain. Throughout 2022 and 2021, the Company experienced shipping bottlenecks and shortages of supply that resulted in its inability to fulfill certain customer orders within normal lead times. This adversely impacted the Company’s revenue and operating results for the years ended December 31, 2022 and 2021. The Company also experienced, in some cases, significant increases in shipping costs. While the Company continues to work with its supply chain, contract manufacturers, logistics partners and customers to minimize the extent of such impacts, the Company expects the effects of global supply chain issues to continue and cannot predict if or when such effects will subside. This may prevent the Company from being able to fulfill our customers’ orders in a timely manner or at all, which could lead to one or more of our customers canceling their orders. At this time, the Company is neither able to estimate the extent of these impacts nor predict whether its efforts to minimize or contain them will be successful.

In addition to the negative impact on the Company’s business from global supply chain challenges related to COVID-19, the Company derived certain benefits that included decreases in certain operating expenses, such as travel and trade show expense, and benefited from certain U.S. government tax relief measures. These benefits began to gradually diminish throughout 2022 and may continue to do so as the various geographies in which the Company operates continue to recover from the pandemic.

In addition, the regions in which the Company operates have experienced a significant increase in inflation, which has adversely impacted the cost to manufacture the Company's products with limited ability to pass such increases on to its customers under previously established fixed price agreements. Inflation has further resulted in increased operating costs, and interest rate increases, which will result in increased debt service costs. If interest rates continue to rise the Company anticipates further adverse effects from inflation and increased interest rates.

At this time the Company is neither able to estimate the extent of these impacts nor predict whether its efforts to minimize or contain them will be successful. The Company intends to continue to monitor its business very closely for any effects of COVID-19, inflation and rising interest rates for as long as necessary.

Subsequent Event Considerations

The Company considers events or transactions that occur after the balance sheet date but prior to the issuance of the financial statements to provide additional evidence for certain estimates or to identify matters that require additional disclosure. Subsequent events have been evaluated as required. The Company has evaluated all subsequent events and, other than those disclosed in Note 20, *Subsequent Events*, has determined that there are no other material recognized or unrecognized subsequent events requiring disclosure in these consolidated financial statements.

Cash, Cash Equivalents and Restricted Cash

Cash and cash equivalents include all highly liquid investments maturing within three months from the date of purchase. As of December 31, 2022 and 2021, the Company's cash and cash equivalents consisted of investments in money market mutual funds.

Restricted cash as of December 31, 2022 and 2021 consisted of a certificate of deposit of $1,013 and $1,001, respectively, pledged as collateral for a stand-by letter of credit required to support a contractual obligation. Restricted cash as of December 31, 2022 and 2021 also included cash of $2,100 pledged as collateral in connection with six and two letters of credit, respectively, to support contractual obligations, as further discussed in Note 17, *Leases*.

The following table is a reconciliation of cash, cash equivalents and restricted cash included in the accompanying consolidated balance sheets that sum to the total cash, cash equivalents and restricted cash included in the accompanying consolidated statements of cash flows.

	December 31, 2022	December 31, 2021
Cash and cash equivalents	$ 126,312	$ 154,703
Restricted cash included in other assets	3,113	3,101
	$ 129,425	$ 157,804

Accounts Receivable

Accounts receivable are presented net of a provision for doubtful accounts, which is an estimate of amounts that may not be collectible. Accounts receivable for customer contracts with customary payment terms, which are one year or less, are recorded at invoiced amounts and do not bear interest. The Company may, in limited circumstances, grant payment terms longer than one year. Payments due beyond 12 months from the balance sheet date are recorded as non-current assets. The Company generally does not require collateral, but the Company may, in certain instances based on its credit assessment, require full or partial prepayment prior to shipment.

Accounts receivable as of December 31, 2022 and 2021 consisted of the following:

	December 31,	
	2022	2021
Current portion of accounts receivable, net:		
Accounts receivable, net	$ 74,407	$ 85,689
Accounts receivable, extended payment terms	77	85
	74,484	85,774
Accounts receivable, net of current portion:		
Accounts receivable, extended payment terms	—	115
	$ 74,484	$ 85,889

The Company performs ongoing credit evaluations of its customers and, if necessary, provides a provision for doubtful accounts and expected losses. When assessing and recording its provision for doubtful accounts, the Company evaluates the age of its accounts receivable, current economic trends, creditworthiness of the customer, customer payment history, and other specific customer and transaction information. The Company also provides an overall expected credit loss amount, based on historical loss rates, in accordance with ASC 326 *Credit Losses*. The Company writes off accounts receivable against the provision when it determines a balance is uncollectible and no longer actively pursues collection of the receivable. Adjustments to the provision for doubtful accounts are recorded as selling, general and administrative expenses in the consolidated statements of operations and comprehensive (loss) income. A summary of changes in the provision for doubtful accounts for the years ended December 31, 2022, 2021 and 2020 is as follows:

	Year Ended December 31,		
	2022	2021	2020
Provision for doubtful accounts at beginning of year	$ 117	$ 58	$ 20
Provisions and recoveries	519	59	38
Write-offs	—	—	—
Provision for doubtful accounts at end of year	$ 636	$ 117	$ 58

As of December 31, 2022, the Company concluded that a portion of amounts due under extended payment terms was more likely than not uncollectible and a reserve of $186 was recorded. As of December 31, 2021, the Company concluded that all amounts due under extended payment terms were collectible and no reserve for credit losses was recorded. During the years ended December 31, 2022, 2021 and 2020, the Company did not write off uncollectible receivables due under extended payment terms.

Inventories

The Company values inventories at the lower of cost or net realizable value. The Company computes cost using the first-in first-out convention. Inventories are composed of hardware and related component parts of finished goods. The Company establishes provisions for excess and obsolete inventories after evaluating historical sales, future demand, market conditions, expected product life cycles, and current inventory levels to reduce such inventories to their estimated net realizable value. The Company makes such provisions in the normal course of business and charges them to cost of revenue in its consolidated statements of operations and comprehensive (loss) income.

The Company includes deferred inventory costs within inventory in its consolidated balance sheets. Deferred inventory costs represent the cost of products that have been delivered to the customer for which revenue associated with the arrangement has been deferred as a result of not meeting all of the required revenue recognition criteria, such as receipt of customer acceptance. The Company recognizes deferred inventory costs as cost of revenue in its consolidated statements of operations and comprehensive (loss) income when the related revenue is recognized.

Property and Equipment

The Company states property and equipment at historical cost less accumulated depreciation. The Company computes depreciation using the straight-line method over the estimated useful lives of the assets. The Company records leasehold improvements at cost with any reimbursement from the landlord being accounted for as deferred rent, which is amortized using the straight-line method over the lease term. The Company also includes costs for trial systems held and used by its customers pursuant to evaluation agreements within property and equipment. The Company depreciates trial systems held and used by its customers over the estimated useful life of such assets, which is two years.

Whenever a trial system is sold to a customer and the selling price is recorded as revenue, the Company removes the related net book value of the trial system sold from property and equipment and records it as a cost of revenue. The Company expenses maintenance and repairs expenditures as incurred.

Estimated useful lives of the respective property and equipment assets are as follows:

	Estimated Useful Life
Computers and purchased software	3 – 4 years
Leasehold improvements	Shorter of lease term or 7 years
Furniture and fixtures	6 – 8 years
Machinery and equipment	3 – 10 years
Building	40 years
Building improvements	5 – 40 years
Trial systems at customers' sites	2 years

Upon retirement or sale, the Company removes the cost of assets disposed of and the related accumulated depreciation from the accounts and any resulting gain or loss is included in (loss) income from operations.

Long-Lived Assets

Long-lived assets consist of property and equipment, right-of-use assets and intangible assets. The Company amortizes its acquired intangible assets subject to amortization using the straight-line method over their estimated useful lives, ranging from three to ten years. Purchased software licenses are classified as intangible assets and are amortized using the straight-line method over their estimated useful lives, typically ranging from three to four years.

The Company evaluates its long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Factors that the Company considers in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative

industry or economic trends and significant changes or planned changes in the use of the assets. The Company measures recoverability of assets to be held and used by a comparison of the carrying amount of an asset to the future undiscounted net cash flows expected to be generated by the asset. If such assets are considered to be impaired, the Company measures the impairment to be recognized by the amount by which the carrying amount of the asset exceeds the fair value of the asset, less the cost to sell. The Company evaluates the recoverability of intangible assets periodically by taking into account events or circumstances that may warrant revised estimates of useful lives or that indicate the asset may be impaired.

The Company considered potential impairment indicators of all long-lived assets. As of December 31, 2022 the Company identified one potential impairment indicator due to the loss of a certain Tier 1 customer related to the customer relationships intangible asset class, which caused a significant underperformance of the business in relation to expectations. This triggered management to perform a quantitative analysis, the result of which did not indicate an impairment. There were no other indicators of impairment as of December 31, 2022 and 2021.

Goodwill

Goodwill represents the excess purchase price over the estimated fair value of net assets acquired through acquisitions. The Company tests goodwill for impairment on an annual basis and between annual tests when impairment indicators are identified, and goodwill is written down when impaired.

The Company performs its annual goodwill impairment test during its fourth quarter. For its annual goodwill impairment test, the Company operates under one reporting unit and the fair value of its reporting unit has been determined based on the Company’s enterprise value. As part of the annual goodwill impairment test, the Company has the option to perform a qualitative assessment to determine whether further impairment testing is necessary. Examples of events and circumstances that might indicate that the reporting unit’s fair value is less than its carrying amount include macro-economic conditions such as deterioration in the entity’s operating environment or industry or market considerations; entity-specific events such as increasing costs, declining financial performance, or loss of key personnel; or other events such as a sustained decrease in the stock price on either an absolute basis or relative to peers. If, as a result of its qualitative assessment, it is more likely than not (i.e., greater than 50% chance) that the fair value of the Company’s reporting unit is less than its carrying amount, the quantitative impairment test will be required. Otherwise, no further testing will be required. The Company completed its qualitative assessment, including consideration of the factors that contributed to the Company's financial performance for the year ended December 31, 2022, and concluded that as of December 31, 2022 and 2021, it is not more likely than not that the fair value of the Company’s reporting unit is less than its carrying amount.

Concentration of Risks

Financial instruments that potentially subject the Company to concentrations of credit risk consist principally of cash and cash equivalents and accounts receivable. Cash and cash equivalents consist of demand deposits, savings accounts, money market mutual funds, and certificates of deposit with financial institutions, which may exceed Federal Deposit Insurance Corporation limits. The Company has not experienced any losses related to its cash and cash equivalents and does not believe that it is subject to unusual credit risk beyond the normal credit risk associated with commercial banking relationships.

The Company grants credit to customers in the ordinary course of business. Credit evaluations are performed on an ongoing basis to reduce credit risk, and no collateral is required from our customers. An allowance for uncollectible accounts is provided for those accounts receivable considered to be uncollectible based upon historical experience and credit evaluation. Due to these factors, no additional losses beyond the amounts provided for collection losses is believed by management to be probable in the Company’s accounts receivable.

Significant customers are those that represent 10% or more of revenue or accounts receivable and are set forth in the following tables:

	Revenue			Accounts Receivable, Net	
	Year Ended December 31,			December 31,	
	2022	2021	2020	2022	2021
Customer A	*	22%	11%	*	21%
Customer B	13%	*	*	*	*
Customer C	*	*	20%	*	*
Customer D	*	*	*	*	19%
Customer E	*	*	*	*	10%
Customer F	*	*	*	12%	*
Customer G	*	*	*	11%	*

* Less than 10% of total

Certain of the components and subassemblies included in the Company's products are obtained and manufactured from a single source or a limited group of suppliers. Although the Company seeks to reduce dependence on those single or limited source suppliers and manufacturers, the partial or complete loss of certain of these sources could have a material adverse effect on the Company's operating results, financial condition and cash flows and damage its customer relationships.

Product Warranties

Substantially all of the Company's products are covered by a warranty for software and hardware for periods ranging from 90 days to two years. In addition, in conjunction with customers' renewals of maintenance and support contracts, the Company offers an extended warranty for periods typically of one to three years for agreed-upon fees. In the event of a failure of a hardware product or software covered by these warranties, the Company must repair or replace the software or hardware or, if those remedies are insufficient, and at the discretion of the Company, provide a refund. The Company's warranty reserve, which is included in accrued expenses and other current liabilities in the consolidated balance sheets, reflects estimated material, labor and other costs related to potential or actual software and hardware warranty claims for which the Company expects to incur an obligation. The Company's estimates of anticipated rates of warranty claims and the costs associated therewith are primarily based on historical information and future forecasts. The Company periodically assesses the adequacy of the warranty reserve and adjusts the amount as necessary. If the historical data used to calculate the adequacy of the warranty reserve are not indicative of future requirements, additional or reduced warranty reserves may be required.

A summary of changes in the amount reserved for warranty costs for the years ended December 31, 2022, 2021 and 2020 is as follows:

	Year Ended December 31,		
	2022	2021	2020
Warranty reserve at beginning of year	$ 2,392	$ 2,354	$ 2,448
Provisions	920	2,339	2,745
Charges	(1,634)	(2,301)	(2,839)
Warranty reserve at end of year	$ 1,678	$ 2,392	$ 2,354

Revenue Recognition

The Company generates revenue from sales of its products, along with associated maintenance, support and extended hardware warranty services, and to a lesser extent, from sales of professional services. Maintenance and support services include telephone support, bug fixes and unspecified software upgrades and updates provided on a when-and-if-available basis and/or extended hardware warranty.

In its consolidated statements of operations and comprehensive (loss) income, the Company classifies revenue from sales of cable, wireless and fixed-line broadband products as product revenue, and revenue from maintenance and support and professional services as service revenue.

In accordance with ASC 606, the Company recognizes revenue when a customer obtains control of promised products or services. The amount of revenue recognized reflects the consideration that the Company expects to be entitled to receive in exchange for these products or services. To achieve the core principle of this standard, the Company applies the following five steps:

1) *Identify the contract with a customer* - The Company considers binding contracts and/or purchase orders to be customer contracts, provided collection is probable. The Company assesses collectability based on a number of factors that generally include information supplied by credit agencies, references and/or analysis of customer accounts and payment history. The Company combines contracts with customers if those contracts were negotiated as a single deal or contain price dependencies.

2) *Identify the performance obligations in the contract* – The Company identifies performance obligations as products and services that will be transferred to the customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available from third parties or from the Company, and are distinct in the context of the contract, whereby the transfer of the products or services is separately identifiable from other promises in the contract.

3) *Determine the transaction price* - The Company determines the transaction price based on the consideration to which the Company expects to be entitled in exchange for transferring products or services to the customer. The Company includes variable consideration in the transaction price if, in its judgment, it is probable that no significant future reversal of cumulative revenue under the contract will occur.

4) *Allocate the transaction price to performance obligations in the contract* – The Company allocates the transaction price to performance obligations based on a relative standalone selling price, or SSP.

5) *Recognize revenue when or as the Company satisfies a performance obligation* – The Company recognizes revenue from product sales upon delivery to the customer, which is generally when control of the asset has passed to the customer. Support revenue is generally recognized over the contract period once the associated product's control has been passed to the customer. Professional services revenue is recognized for the fee-based arrangements upon completion of the service and receipt of acceptance, if applicable.

Performance Obligations

The majority of the Company's contracts with customers contain multiple performance obligations including products and maintenance services, and on a limited basis, professional services. For these contracts, the Company accounts for individual performance obligations separately if they are considered distinct. The Company's cable, wireless and fixed-line broadband products, maintenance services and professional services are considered distinct performance obligations. When multiple performance obligations exist in a customer contract, the Company allocates the transaction price to the separate performance obligations on a relative SSP basis. The Company determines SSP using its judgment and based on the best evidence available, which may include the selling price of products when sold on a standalone basis to similar customers in similar circumstances, or in the absence of standalone sales, taking into consideration the Company's historical pricing practices by customer type, selling method (i.e., resellers or direct), and geographic-specific market factors.

Product revenue

Some of the Company's cable, wireless and fixed-line broadband products have both software and non-software (i.e., hardware) components that function together to deliver the products' essential functionality. In these instances, the Company's hardware cannot be used apart from the embedded software and is considered one distinct performance obligation. The Company recognizes revenue for both new and existing customers at a point in time when control of the products is transferred to the customer, which is typically when title and risk of loss have transferred and the right to payment is enforceable. The Company also earns revenue from the sale of perpetual software licenses and/or software-enabled capacity expansions. Revenue on perpetual software licenses and software-enabled capacity expansions for existing customers are also distinct performance obligations as they are separately identifiable and provide additional bandwidth capacity on hardware products already purchased by the customer. The Company recognizes revenue on perpetual software licenses and software-enabled capacity expansions when control is transferred, which is typically as the software entitlements are made available to the customer.

When customer contracts require acceptance of product and services, the Company considers the nature of the acceptance provisions to determine if they are substantive or considered perfunctory to determine if these acceptance provisions impact the timing of revenue recognition. When acceptance provisions are considered substantive, the Company will defer revenue on all performance obligations in the contract subject to acceptance until acceptance has been received. The Company does not defer revenue when acceptance provisions are deemed perfunctory.

Maintenance and Support Services and Professional Services Revenue

Other than with respect to certain of its CPE products, the Company generally sells its products with maintenance and support services, a distinct performance obligation that includes the stand-ready obligation to provide telephone support, bug fixes and unspecified software upgrades and updates provided on a when-and-if-available basis and/or extended hardware warranty. After the initial sale, customers may purchase annual renewals of support contracts. The Company's telephone support and unspecified upgrades and updates are delivered over time, and the Company therefore recognizes revenue ratably over the contract term, which is typically one year, but can be as long as five years. The Company also generates revenue from sales of professional services, such as installation, configuration and training. Professional services are a distinct performance obligation since the Company's products are functional without these services and can generally be performed by the customer or a third party. The Company generally recognizes fee-based professional services delivered at a point in time as the professional services are completed and upon receipt of acceptance if applicable.

The sale of the Company's products generally includes a 90-day warranty on the software and a one-year warranty on the hardware component of the products, which includes repair or replacement of the applicable hardware. These warranties are to ensure the products perform in accordance with the Company's specifications and are therefore not a performance obligation. The Company records a warranty accrual for the initial software and hardware warranty included with product sales and does not defer revenue.

Resellers and Sales Agents

The Company markets and sells its products through its direct global sales force, supported by sales agents, and through resellers. The Company's resellers receive an order from an end customer prior to placing an order with the Company, and the Company confirms the identification of or is aware of the end customer prior to accepting such order. The Company invoices the reseller an amount that reflects a reseller discount and records revenue based on the amount of the discounted transaction value. Aside from wireless and fixed-line broadband hardware products, the Company's resellers do not stock inventory received from the Company.

When the Company transacts with a reseller, the contract is with the reseller and not with the end customer. Whether the Company transacts business with and receives the order directly from the reseller or a customer, its revenue recognition policy and resulting pattern of revenue recognition for the order are the same.

The Company has assessed whether it is principal (i.e., reports revenue on a gross basis) or agent (i.e., reports revenue on a net basis) by evaluating whether it has control of the good or service before it is transferred to the reseller. As the Company controls the promised good or service before transferring it to the reseller, it acts as the principal in the transaction. Accordingly, the Company reports revenue on a gross basis.

The Company also uses sales agents that assist in the sales process with certain customers, primarily located in the Latin America and Asia-Pacific regions. Sales agents are not resellers. If a sales agent is engaged in the sales process, the Company receives the order directly from the end customer and sells the products and services directly to the end customer, and the Company pays a commission to the sales agent, calculated as a percentage of the related transaction value. Accounting considerations related to sales agent commissions are discussed in the "Costs to Obtain or Fulfill a Contract" section below.

Costs to Obtain or Fulfill a Contract

The Company capitalizes commission expenses paid to internal sales personnel and sales agent commissions that are incremental to obtaining customer contracts, for which the related revenue is recognized over a future period greater than 12 months. These costs are incurred on initial sales of product, professional services, and maintenance and support contract renewals. The Company defers these costs and amortizes them over the period of benefit, which is generally considered to be the contract term. The Company has elected to use the practical expedient, allowing the Company to recognize the incremental costs of obtaining a contract as an expense when incurred if the amortization period of the asset that the entity otherwise would have recognized is one year or less.

Commissions paid relating to maintenance and support contract renewals of twelve months or less are expensed as incurred as commissions paid on renewals are commensurate with commissions paid on initial sales transactions. Costs to obtain a contract for professional services contracts are expensed as incurred in accordance with the practical expedient as the contractual period of the Company's professional services contracts are one year or less. The Company periodically reviews the carrying amount of capitalized contract costs to determine whether events or changes in circumstances have occurred that could impact the period of benefit.

Deferred Revenue

The Company recognizes amounts billed in excess of revenue recognized as deferred revenue. Deferred revenue includes customer deposits, amounts billed for maintenance and support services contracts in advance of services being performed, amounts for trade-in right liabilities and amounts related to contracts that have been deferred as a result of not meeting the required revenue recognition criteria as of the end of the reporting period. The Company reports deferred revenue expected to be recognized as revenue more than one year subsequent to the balance sheet date within long-term liabilities in the consolidated balance sheets.

The Company defers recognition of direct costs, such as cost of goods and services, until recognition of the related revenue. The Company classifies such costs as current assets if the related deferred revenue is classified as current and as non-current assets if the related deferred revenue is classified as non-current.

Other Revenue Recognition Policies

The Company's customary payment terms are generally 90 days or less. The Company has elected to apply the practical expedient that allows an entity to not adjust the promised amount of consideration in customer contracts for the effect of a significant financing component when the period between the transfer of product and services and payment of the related consideration is less than one year. If the Company provides extended payment terms that represent a significant financing component, the Company adjusts the amount of promised consideration for the time value of money using an appropriate discount rate and recognizes interest income separate from the revenue recognized on contracts with customers.

In limited instances, the Company has offered future rebates to customers based on a fixed or variable percentage of actual sales volumes over specified periods. The future rebates earned based on the customer's purchasing from the Company in one period may be used as credits to be applied by them against accounts receivable due to the Company in later periods. The Company accounts for these future rebates as variable consideration and reduces the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized will occur when the variable consideration is resolved. The Company estimates the reduction of the transaction price based on historical activity and other relevant factors and recognizes it when the Company recognizes revenue for the transfer of goods and services to the customer on which the future rebate was earned. Other forms of contingent revenue or variable consideration are infrequent.

The Company excludes any taxes assessed by a governmental authority that are directly imposed on a revenue-producing transaction (e.g., sales, use and value added taxes) from its transaction price.

The Company records billings to customers for reimbursement of out-of-pocket expenses, including travel, lodging and meals, as revenue, and the associated costs incurred by the Company as cost of revenue. Revenue related to the reimbursement of out-of-pocket costs are accounted for as variable consideration.

The Company accounts for any shipping and handling activities as a fulfillment cost rather than an additional promised service. The Company records shipping and handling billed to customers as an offset to cost of revenue.

Stock-Based Compensation

The Company measures stock options and other stock-based awards granted to employees and directors based on the fair value on the date of grant and recognizes compensation expense of those awards, net of estimated forfeitures, over the requisite service period, which is generally the vesting period of the respective award. Generally, the Company issues stock options with only service-based vesting conditions and records the expense for these awards using the straight-line method.

The Company classifies stock-based compensation expense in its consolidated statements of operations and comprehensive (loss) income in the same manner in which the award recipient's payroll costs are classified or in which the award recipient's service payments are classified.

The Company recognizes compensation expense for only the portion of awards that are expected to vest. In developing a forfeiture rate estimate, the Company has considered its historical experience to estimate pre-vesting forfeitures for service-based awards. The impact of a forfeiture rate adjustment will be recognized in full in the period of adjustment, and if the actual forfeiture rate is materially different from the Company's estimate, the Company may be required to record adjustments to stock-based compensation expense in future periods.

The Company estimates the fair value of each stock option and stock appreciation right, or SAR, grant on the date of grant using the Black-Scholes option pricing model. The Company was a private company until December 14, 2017 and lacked sufficient company-specific historical and implied volatility information for its stock. Therefore, for all options granted in 2020 or before, the Company estimated its expected stock volatility based on the historical volatility of publicly traded peer companies. Beginning with options granted in 2021, the Company estimates its expected stock volatility using a weighted-average calculation based on the historical volatility of the Company and publicly traded peer companies and expects to continue to do so until such time as it has adequate historical data regarding the volatility of its own traded stock price. The expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla" options. The expected term of stock options granted to non-employees is equal to the contractual term of the option award. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company does not have a history of declaring or paying cash dividends, except for the special cash dividends declared in November 2014, June 2016, December 2016, May 2017 and November 2017, and in those circumstances the Company's board of directors approved cash dividends to be paid to holders of the Company's stock options, stock appreciation rights, or SARs, and restricted stock units, or RSUs, upon vesting as an equitable adjustment to the holders of such instruments.

The Company has granted SARs to certain employees, which require the Company to pay in cash, upon exercise, an amount equal to the product of the excess of the per share fair market value of the Company's common stock on the date of exercise over the exercise price, multiplied by the number of shares of common stock with respect to which the SAR is exercised. Because these awards may require the Company to settle the awards in cash, the Company accounts for them as a liability in the Company's consolidated balance sheets. The Company recognizes the liability related to these awards, as well as related compensation expense, over the period during which services are rendered until completed. All SAR awards became fully vested on January 1, 2020. The Company will continue to remeasure the fair market value of the liability until the award is either exercised or canceled, with changes in the fair value of the liability recorded in the consolidated statements of operations and comprehensive (loss) income.

Research and Development Costs

The Company expenses research and development costs as incurred. The Company expenses costs incurred to develop software to be licensed to customers prior to the establishment of technological feasibility of the software and capitalizes them thereafter until commercial release of the software. The Company has not historically capitalized software development costs as the establishment of technological feasibility typically occurs shortly before the commercial release of its software, which is embedded in its products. As such, the Company expenses all software development costs related to software to be licensed to customers as incurred and includes such amounts within research and development expense in the accompanying consolidated statements of operations and comprehensive (loss) income.

Advertising Costs

The Company expenses advertising costs as incurred and includes them in selling, general and administrative expense in the accompanying consolidated statements of operations and comprehensive (loss) income. Advertising expenses were not significant for any periods presented.

Foreign Currency Translation

For the Company's subsidiaries in Ireland and Australia, the U.S. dollar is the functional currency. For each of the Company's other foreign subsidiaries, the functional currency is its local currency. Assets and liabilities of these foreign subsidiaries are translated into U.S. dollars using period-end exchange rates, and revenue and expenses are translated into U.S. dollars using average exchange rates in effect during each period. The Company includes the effects of these foreign currency translation adjustments in accumulated other comprehensive (loss) income, a separate component of stockholders' equity.

The Company includes foreign currency transaction (losses) gains in its consolidated statements of operations and comprehensive (loss) income as a component of other income (expense). They totaled $1,730, $(2,113), and $452 for the years ended December 31, 2022, 2021 and 2020, respectively.

Fair Value Measurements

The Company carries certain assets and liabilities at fair value under GAAP. Fair value is defined as the price that would be received for an asset or the exit price that would be paid to transfer a liability in the principal or most advantageous market

in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

Level 1— Quoted prices in active markets for identical assets and liabilities.

Level 2— Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities at the measurement date; quoted prices in markets that are not active for identical or similar assets and liabilities; or other inputs that are observable or can be corroborated by observable market data.

Level 3— Unobservable inputs that involve management judgment and are supported by little or no market activity, including pricing models, discounted cash flow methodologies and similar techniques.

The categorization of a financial instrument within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

The Company carries cash equivalents, marketable securities, foreign currency forward contracts and SARs at fair value, determined according to the fair value hierarchy described above (see Note 7, *Fair Value Measurements*). The fair values of cash equivalents, accounts receivable, accounts payable and accrued expenses and other current liabilities approximate their fair values due to the short-term nature of these assets and liabilities, with the exception of amounts recorded by the Company as “accounts receivable, non-current,” which represent amounts billed to customers for which payment has not yet become due and for which an offsetting amount of deferred revenue has been recorded. The carrying values of the Company’s debt obligations (see Note 10, *Debt*) as of December 31, 2022 and 2021 approximated their fair values because the debt bears interest at rates the Company would be required to pay on the issuance of debt with similar terms, based on an analysis of recent market conditions and other Company-specific factors.

Income Taxes

The Company accounts for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial statement and tax basis of assets and liabilities, as measured by enacted tax rates anticipated to be in effect when these differences reverse. This method also requires the recognition of future tax benefits to the extent that realization of such benefits is more likely than not. Deferred tax expense or benefit is the result of changes in the deferred tax assets and liabilities. The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent it believes, based upon the weight of available evidence, that it is more likely than not that all or a portion of the deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. The Company evaluates the potential for recovery of deferred tax assets by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies. As of December 31, 2022, we determined that it is more likely than not that our worldwide net deferred tax assets will not be realized, and thus maintain a valuation allowance against our worldwide net deferred tax assets (see Note 9, *Income Taxes*, to our accompanying financial statements).

The Company records a liability for potential payments of taxes to various tax authorities related to uncertain tax positions and other tax matters. The Company bases the recorded liability on its determination of whether and how much of a tax benefit taken by the Company in its tax filings or positions is “more likely than not” to be realized. The amount of the benefit that may be recognized in the financial statements is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. To the extent that the assessment of such tax positions changes, the Company records the change in estimate in the period in which the determination is made. The Company establishes a liability, which is included in accrued income taxes in the consolidated balance sheets, for tax-related uncertainties based on estimates of whether, and the extent to which, additional taxes will be due. The Company establishes these liabilities when the Company believes that certain positions might be challenged despite its belief that the tax return positions are fully supportable. The Company adjusts the recorded liability in light of changing facts and circumstances. The (benefit from) provision for income taxes includes the impact of the recorded liability and changes thereto.

The Company recognizes interest and penalties related to uncertain tax positions within other income (expense) in the accompanying consolidated statements of operations and comprehensive (loss) income. The Company records accrued interest and penalties in accrued income taxes in the consolidated balance sheets.

For taxable years beginning after January 1, 2018, taxpayers are subjected to the global intangible low-taxed income, or GILTI, provisions. The GILTI provisions require the Company to currently recognize in U.S. taxable income a deemed dividend inclusion of foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary's tangible assets. The ability to benefit from a deduction and foreign tax credits against a portion of the GILTI income may be limited under the GILTI rules as a result of the utilization of net operating losses, foreign sourced income, and other potential limitations within the foreign tax credit calculation. During the years ended December 31, 2022, 2021 and 2020 the Company recorded income tax charges of $695, $2,630, and $3,483, respectively, related to GILTI. The Company has made an accounting policy election to recognize the impacts of GILTI within the period incurred. Therefore, no U.S. deferred taxes are provided on GILTI inclusions of future foreign subsidiary earnings.

Comprehensive (Loss) Income

Comprehensive (loss) income includes net (loss) income as well as other changes in stockholders' equity (deficit) that result from transactions and economic events other than those with stockholders. Comprehensive (loss) income for the periods presented consists of net (loss) income and the change in the cumulative foreign currency translation adjustment.

Net (Loss) Income per Share

Basic net (loss) income per share attributable to common stockholders is computed by dividing the net (loss) income attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period. Diluted net (loss) income attributable to common stockholders is computed by adjusting net (loss) income attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net (loss) income per share attributable to common stockholders is computed by dividing the diluted net (loss) income attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period, including potential dilutive common shares. For purpose of this calculation, outstanding stock-based awards are considered potential dilutive common shares.

Impact of Recently Adopted Accounting Standards

Leases

In February 2016, the FASB issued ASU 2016-02, *Leases* (Topic 842): *Amendments to FASB Accounting Standards Codification*, or ASU 2016-02, which replaces the existing guidance for leases. ASU 2016-02 requires the identification of arrangements that should be accounted for as leases by lessees. In general, for lease arrangements exceeding a twelve-month term, the arrangements must now be recognized as assets and liabilities on the balance sheet of the lessee. Under ASU 2016-02, a right-of-use asset and lease obligation will be recorded for all leases, whether operating or financing, while the income statement will reflect lease expense for operating leases and amortization/interest expense for financing leases. The balance sheet amount recorded for existing leases at the date of adoption of ASU 2016-02 must be calculated using the applicable incremental borrowing rate at the date of adoption. This guidance is effective for private companies, and emerging growth companies that choose to take advantage of the extended transition periods, for annual reporting periods beginning after December 15, 2021, and interim periods within fiscal years beginning after December 15, 2022. Since the Company ceased to be an emerging growth company as of December 31, 2022, the Company began reporting on topics required by ASU 2016-02 for the period ended December 31, 2022, using the modified retrospective approach as permitted by the standard. The Company elected the package of practical expedients permitted under the transition guidance within the new standard, which among other things allow for the carryforward of historical lease classification. The Company also elected the practical expedient that allows for an accounting policy election to exclude right of use assets and lease obligations from the balance sheet for all leases with an initial term of 12 months or less.

The adoption of ASU 2016-02 had a material impact on the Company's consolidated balance sheet, but did not have a material impact on the Company's consolidated statements of operations or cash flows. The most significant impact of the adoption of ASU 2016-02 was the recognition of additional right-of-use assets and lease liabilities for operating leases. Upon adoption, the Company recognized approximately $6,493 of right-of-use assets and $6,764 of lease liabilities. Refer to Note 17, *Leases*, for further discussion.

Measurement of Credit Losses on Financial Instruments

In June 2016, the FASB issued ASU 2016-13, *Measurement of Credit Losses on Financial Instruments*, or ASU 2016-13. This guidance is intended to provide more decision-useful information about expected credit losses on financial instruments and other commitments to extend credit held by a reporting entity at each reporting date. The main provisions

include presenting financial assets measured at amortized cost at the amount expected to be collected, which is net of an allowance for expected credit losses and recording credit losses related to available-for-sale securities through an allowance for credit losses. The effective dates for the amendments in ASU 2016-13 were updated in ASU 2019-10, *Financial Instruments – Credit Losses (Topic 326), Derivatives and Hedging (Topic 815), and Leases (Topic 842)*, and as such ASU 2016-13 is now effective for the Company. The Company began reporting on topics required by ASU 2016-13 for the year ended December 31, 2022. As permitted under by the standard, the company is using a modified retrospective approach. The adoption did not have a material impact on the Company's financial position or results of operations.

Business Combinations

In October 2021, the FASB issued ASU 2021-08, *Business Combinations (Topic 805): Accounting for Contract Assets and Contract Liabilities from Contracts with Customers*, or ASU 2021-08. Under ASU 2021-08, an acquirer must recognize and measure contract assets and contract liabilities acquired in a business combination in accordance with Topic 606. The guidance is effective for interim and annual periods beginning after December 15, 2022, with early adoption permitted. Effective January 1, 2022, the Company early adopted ASU 2021-08 on a prospective basis. The adoption did not have a material impact on the Company's financial position or results of operations.

3. Goodwill and Intangibles

Goodwill

There have been no changes to the $50,177 carrying amount of goodwill since December 31, 2020.

Intangible Assets

Identifiable intangible assets consist of developed technology, amortized over seven years using a straight-line amortization method; customer relationships, amortized over ten years using a straight-line amortization method; and a trade name, amortized over three years using a straight-line amortization method. The weighted-average life of these identifiable intangible assets recognized is 8.2 years. In addition, intangible assets include purchased software to be used in the Company's products, amortized over three years using a straight-line amortization. Intangible assets are not deductible for tax purposes.

Intangible assets, net consisted of the following at December 31, 2022 and 2021, respectively:

	As of December 31, 2022		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Developed technology	25,000	(12,502)	12,498
Customer relationships	18,000	(6,300)	11,700
Trade name	1,000	(1,000)	—
Purchased software	2,545	(984)	1,561
Totals as of December 31, 2022	$ 46,545	$ (20,786)	$ 25,759

	As of December 31, 2021		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
Developed technology	25,000	(8,930)	16,070
Customer relationships	18,000	(4,500)	13,500
Trade name	1,000	(830)	170
Purchased software	1,832	(428)	1,404
Totals as of December 31, 2021	$ 45,832	$ (14,688)	$ 31,144

As of December 31, 2022, amortization expense on existing intangible assets for the next five years and beyond is summarized as follows:

Year Ending December 31,		
2023	$	6,002
2024		5,899
2025		5,754
2026		3,604
2027		1,800
Thereafter		2,700
	$	25,759

A summary of amortization expense recorded during the years ended December 31, 2022 and 2021 is as follows:

	Year Ended December 31,					
	2022		2021		2020	
Product cost of revenue	$	3,572	$	3,572	$	3,571
Research and development		556		396		32
Selling, general and administrative		1,970		2,132		2,133
Totals	$	6,098	$	6,100	$	5,736

4. Inventory

Inventory as of December 31, 2022 and 2021 consisted of the following:

	December 31,			
	2022		2021	
Raw materials	$	47,581	$	53,934
Finished goods:				
Manufactured finished goods		32,863		29,597
Deferred inventory costs		1,351		1,297
	$	81,795	$	84,828

5. Property and Equipment

Property and equipment as of December 31, 2022 and 2021 consisted of the following:

	December 31,			
	2022		2021	
Computers and purchased software	$	25,572	$	25,775
Leasehold improvements		4,226		4,198
Furniture and fixtures		2,471		2,672
Machinery and equipment		34,502		37,325
Land		3,091		3,091
Building		4,765		4,765
Building improvements		7,374		7,291
Trial systems at customers' sites		2,582		3,848
		84,583		88,965
Less: Accumulated depreciation and amortization		(65,065)		(65,457)
	$	19,518	$	23,508

During the years ended December 31, 2022, 2021 and 2020, the Company transferred trial systems into inventory from property and equipment with values of $1,266, $1,452, and $1,259, respectively, net of transfers of trial systems to cost of

revenue. In addition, during the years ended December 31, 2022, 2021 and 2020, the Company transferred $2,358, $993, and $805 of equipment from inventory into property and equipment, respectively.

Total depreciation and amortization expense on property and equipment totaled $7,275, $9,580, and $12,234, for the years ended December 31, 2022, 2021 and 2020, respectively.

6. Accrued Expenses and Other Current Liabilities

Accrued expenses and other current liabilities as of December 31, 2022 and 2021 consisted of the following:

	December 31,	
	2022	**2021**
Current liabilities		
Accrued compensation and related taxes	$ 11,666	$ 21,751
Accrued warranty	1,678	2,392
Inventory-related accruals	5,819	8,391
Warranty settlement provision (see Note 18)	3,761	—
Other accrued expenses	8,901	8,848
Accrued expenses and other current liabilities	$ 31,825	$ 41,382
Non-current liabilities		
Warranty settlement provision, net of current portion (see Note 18)	$ 6,119	$ —
Other accrued expenses, net of current portion	1,787	1,701
Other liabilities, net of current portion	$ 7,906	$ 1,701

7. Fair Value Measurements

The Company's cash equivalents include money market mutual funds, which are valued using Level 1 inputs in the fair value hierarchy. The Company's restricted cash consists of certificates of deposit, which are valued using Level 2 inputs in the fair value hierarchy. The Company's foreign currency forward contracts are valued using Level 2 inputs in the fair value hierarchy. The Company values its SARs using Level 3 inputs in the fair value hierarchy based on management's judgment and the assumptions set forth in Note 12, *Stock Based Compensation*, as there is no market activity to derive an estimate of their fair value. The Company records changes in the fair value of SARs in operating expenses in the consolidated statements of operations and comprehensive (loss) income.

The following tables present information about the fair value of the Company's financial assets and liabilities as of December 31, 2022 and 2021 and indicate the level of the fair value hierarchy utilized to determine such fair values:

	Fair Value Measurements as of December 31, 2022 Using:			
	Level 1	**Level 2**	**Level 3**	**Total**
Assets:				
Certificates of deposit—restricted cash	$ —	$ 1,013	$ —	$ 1,013
Money market mutual funds	90,984	—	—	90,984
	$ 90,984	$ 1,013	$ —	$ 91,997

	Fair Value Measurements as of December 31, 2021 Using:			
	Level 1	**Level 2**	**Level 3**	**Total**
Assets:				
Certificates of deposit—restricted cash	$ —	$ 1,001	$ —	$ 1,001
Money market mutual funds	93,792	—	—	93,792
Forward currency forward contract	—	5	—	5
	$ 93,792	$ 1,006	$ —	$ 94,798
Liabilities:				
SARs	$ —	$ —	$ 358	$ 358

During the years ended December 31, 2022, 2021 and 2020 there were no transfers between Level 1, Level 2 and Level 3.

The liability for SARs in the table above consists of the fair value of the SARs granted to the Company's employees. The fair values of the SARs are based on significant inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy. The Company's valuation of these SARs utilized the Black-Scholes option-pricing model, which incorporates assumptions and estimates to determine their fair values (see Note 2, *Summary of Significant Accounting Policies*). The Company assesses these assumptions and estimates on a quarterly basis as additional information impacting the assumptions is obtained. The Company recognizes changes in the fair value of the SARs liability as stock-based compensation expense in the consolidated statements of operations and comprehensive (loss) income.

The following table provides a summary of changes in the fair values of the Company's SARs liability, for which fair value is determined by Level 3 inputs:

	Year Ended December 31,		
	2022	**2021**	**2020**
Fair value at beginning of the year	$ 358	$ 493	$ 264
Change in fair value	(159)	—	229
Exercises	(199)	(135)	—
Fair value at end of year	$ —	$ 358	$ 493

The Company's cash, cash equivalents and restricted cash as of December 31, 2022 and 2021 consisted of the following:

	December 31,	
	2022	**2021**
Cash	$ 35,328	$ 60,911
Cash equivalents and restricted cash:		
Restricted cash	3,113	3,101
Money market mutual funds	90,984	93,792
Total cash equivalents and restricted cash	94,097	96,893
Total cash, cash equivalents and restricted cash	$ 129,425	$ 157,804

8. Derivative Instruments

The Company has certain international customers that are billed in foreign currencies. To mitigate the volatility related to fluctuations in the foreign exchange rates for accounts receivable denominated in foreign currencies, the Company enters into foreign currency forward contracts. As of December 31, 2021, the Company had a foreign currency forward contract outstanding with a notional amount totaling 241 Euros related to the Company's Irish subsidiary. This contract matured during the first quarter of 2022. As of December 31, 2022, the Company had no foreign currency forward contracts outstanding.

The Company's foreign currency forward contracts described above economically hedged certain risks, but were not designated as hedges for financial reporting purposes, and accordingly, the Company recorded all changes in the fair value of the derivative instruments as unrealized foreign currency transaction gains or losses and included them in the consolidated statements of operations and comprehensive (loss) income as a component of other income (expense). The Company records derivative instruments in the consolidated balance sheet at their fair values. As of December 31, 2021, the Company recorded an asset of $5 relating to an outstanding foreign currency forward contract, which was included in prepaid expenses and other current assets in the consolidated balance sheets. As of December 31, 2022, the Company recorded no asset or liability related to outstanding foreign currency forward contracts.

The Company also faces exposure to foreign currency exchange rate fluctuations, as a certain portion of its expenses are denominated in currencies other than U.S. dollars. In certain instances, the Company utilizes forward contracts to hedge against foreign currency fluctuations. These contracts are used to minimize foreign gains or losses, as the gains or losses on the derivative are intended to offset the losses or gains on the underlying exposure. The Company does not engage in foreign currency speculation.

The Company designed its foreign currency risk management strategy principally to mitigate the potential financial impact of changes in the value of transactions and balances denominated in foreign currencies resulting from changes in foreign currency exchange rates. The Company may enter into cash flow hedges that utilize foreign currency forward contracts to hedge specific forecasted transactions of its foreign subsidiaries with the goal of protecting its budgeted expenses against foreign currency exchange rate changes compared to its budgeted rates.

During the year ended December 31, 2020, the Company settled two cash flow hedges with notional amounts of AUD $8,500 and AUD $5,000 to hedge certain Australian Dollar cash flows incurred during the period. The Company reclassified the amount of $752 from other comprehensive (loss) income for the year ended December 30, 2020. The Company recognized the full amount of the fair value of the derivatives on the settlement date of USD $1,613 proportionately as USD $124 cost of goods sold, USD $890 research and development expense and USD $599 selling, general and administrative expense in the consolidated statement of comprehensive income for the year ended December 31, 2020. The Company did not have any cash flow hedges outstanding as of December 31, 2022 or 2021.

9. Income Taxes

(Loss) income before the provision for (benefit from) income taxes for the years ended December 31, 2022, 2021 and 2020 consisted of the following:

	Year Ended December 31,		
	2022	2021	2020
United States	$ (38,599)	$ (32,059)	$ (32,755)
Foreign	(39,991)	35,553	42,504
	$ (78,590)	$ 3,494	$ 9,749

The provision for (benefit from) income taxes for the years ended December 31, 2022, 2021 and 2020 consisted of the following:

	Year Ended December 31,		
	2022	2021	2020
Current income tax provision (benefit):			
Federal	$ 1,718	$ (7,709)	$ (24,409)
State	708	(57)	228
Foreign	1,891	8,984	11,655
Total current income tax provision (benefit)	4,317	1,218	(12,526)
Deferred income tax (benefit) provision:			
Federal	—	72	171
State	—	—	97
Foreign	(3,702)	(1,003)	(2,794)
Total deferred income benefit	(3,702)	(931)	(2,526)
Total income tax provision (benefit)	$ 615	$ 287	$ (15,052)

A reconciliation of the U.S. federal statutory rate to the Company's effective income tax rate for the years ended December 31, 2022, 2021 and 2020 is as follows:

	Year Ended December 31,		
	2022	2021	2020
Federal statutory income tax rate	21.0%	21.0%	21.0%
State taxes, net of federal tax benefit	1.4	(61.9)	(6.8)
Research and development tax credits	7.4	494.4	(37.6)
Permanent differences	—	(20.6)	(11.5)
Foreign tax rate differential	4.8	(42.6)	7.3
Stock-based compensation	(1.6)	(61.8)	8.6
Foreign taxes withheld	(2.0)	79.9	23.1
Rate impact from CARES Act	—	(69.2)	(63.9)
Global intangible low-taxed income	(0.9)	75.3	35.7
Withholding tax on repatriation of accumulated earnings of foreign subsidiaries	0.1	1.9	1.0
Valuation allowance on deferred tax assets	(28.1)	146.2	(146.9)
Other, net	(0.6)	8.2	(7.5)
Foreign derived intangible income	2.2	—	—
Research and development costs	(3.0)	(254.6)	20.0
Uncertain tax positions	(0.5)	(343.4)	(3.2)
Non-deductible executive compensation expense	(1.0)	35.4	6.3
Effective income tax rate	(0.8)%	8.2%	(154.4)%

The income tax effect of each type of temporary difference and carryforward as of December 31, 2022 and 2021 was as follows:

	December 31,	
	2022	2021
Deferred tax assets:		
Stock compensation	$ 4,025	$ 4,050
Tax credit carryforwards	11,400	12,463
Net operating loss carryforward	10,322	4,695
Capitalized research and development costs	20,418	8,322
Inventory valuation	6,974	4,070
Accrued liabilities and reserves	4,147	5,680
Deferred revenue	792	295
Interest expense	1,765	2,436
Lease liability	1,218	—
Other	1,018	607
Total deferred tax assets	62,079	42,618
Valuation Allowance	(51,667)	(29,457)
Deferred tax assets, net of valuation allowance	10,412	13,161
Deferred tax liabilities:		
Depreciation	(1,418)	(1,488)
Amortization	(7,286)	(8,938)
Deferred costs	(244)	(4,946)
Withholding tax on unremitted earnings	(1,471)	(2,721)
ROU Asset	(1,165)	—
Prepaid expenses	(318)	(260)
Total deferred tax liabilities	(11,902)	(18,353)
Net deferred tax liabilities	$ (1,490)	$ (5,192)

Effective January 1, 2022, the Tax Cuts and Jobs Act of 2017 (the "TCJA") requires the Company to capitalize, and subsequently amortize R&D expenses over five years for research activities conducted in the United States and over fifteen years for research activities conducted outside of the United States. This resulted in a material increase to the Company's U.S. income tax liability and net deferred tax assets. Furthermore, since the Company provides for a full valuation allowance against its U.S. deferred tax assets, this had an adverse effect on its effective tax rate.

The Company has determined that it is more likely than not that its net worldwide deferred tax assets will not be realized. As of December 31, 2022, the Company maintains a valuation allowance of $51,667 against its worldwide net deferred tax assets, an increase of $22,210 during the year ended December 31, 2022. The increase in valuation allowance is primarily due to operating results (losses incurred) of the Company in 2022. In determining the need for a valuation allowance, the Company has given consideration to its worldwide cumulative loss position when assessing the weight of the sources of taxable income that can be used to support the realizability of its deferred tax assets. The Company does not anticipate sufficient taxable income or tax liability to utilize its net worldwide deferred tax assets in the foreseeable future. The Company will continue to monitor the realizability of its deferred tax assets and consider multiple factors, including recent operating results, existing taxable temporary differences, future taxable income projections and tax planning strategies. The Company intends to maintain a valuation allowance on its net worldwide deferred tax assets until there is sufficient positive evidence to support the reversal of all or some portion of the valuation allowances. The release of all, or a portion of, the valuation allowance would result in the recognition of certain deferred tax assets and a decrease to income tax expense for the period the release is recorded.

On March 27, 2020, the Coronavirus Aid, Relief and Economic Security, or CARES, Act was signed into law. Among other things, the CARES Act permits net operating loss, or NOL, carryovers and carrybacks to offset 100% of taxable income for taxable years beginning before 2021. In addition, the CARES Act allows NOLs incurred in 2018, 2019 and 2020 to be carried back to each of the five preceding taxable years to generate a refund of previously paid income taxes. During the year ended December 31, 2021, the Company recorded a tax benefit of $7,097 associated with a change in estimate of its refund claims under the CARES Act. During the year ended December 31, 2020, the Company recorded a tax benefit of $23,518 due to the carryback of its 2019 and 2020 U.S. NOLs which resulted in a tax benefit at a higher tax rate in the carryback period, as well as a reduction to the valuation allowance on deferred tax assets that were previously determined to not be more-likely-than-not realizable. The CARES Act also contains modifications on the limitation of business interest for tax years beginning in 2019 and 2020. The modifications to Section 163(j) increased the allowable business interest deduction from 30% of adjusted taxable income to 50% of adjusted taxable income.

Effective for taxable years beginning after January 1, 2018, taxpayers are subjected to the GILTI provisions. The GILTI provisions require the Company to currently recognize in U.S. taxable income a deemed dividend inclusion of foreign subsidiary earnings in excess of an allowable return on the foreign subsidiary’s tangible assets. The ability to benefit from a deduction and foreign tax credits against a portion of the GILTI income may be limited under the GILTI rules as a result of the utilization of net operating losses, foreign sourced income, and other potential limitations within the foreign tax credit calculation. The Company made an accounting policy election, as allowed by the SEC and FASB, to recognize the impacts of GILTI within the period incurred. During the years ended December 31, 2022, 2021 and 2020, the Company recorded income tax charges of $695, $2,630, and $3,483, respectively, related to GILTI.

As a result of foreign tax law developments occurring during the years ended December 31, 2022 and 2021, the Company recorded tax benefits of $1,582 and $2,869, respectively. This net tax benefit is presented within the research and development tax credits and research and development costs positions effective rate reconciliation components above.

As of December 31, 2022, the Company had federal NOL carryforwards of $769 that can be carried forward indefinitely and state NOL carryforwards of $15,449, of which $9,794 will begin to expire in 2031 and $5,655 can be carried forward indefinitely. As of December 31, 2022, the Company had available federal and state research and development tax credit carryforwards of $366 and $12,830, respectively, which begin to expire in 2038 and 2031, respectively. Management believes that it is more likely than not that the Company will not realize the benefit of its federal and state net operating losses and research and development tax credits and thus has recorded a valuation allowance against these deferred tax assets.

As of December 31, 2022, the Company had foreign net operating loss carryforwards of $31,668, of which $2,268 will begin to expire in 2024 and $29,400 can be carried forward indefinitely.

As of December 31, 2022, the Company has foreign subsidiary unremitted earnings of $50,708, the majority of which can be distributed in a tax free manner. The Company has recorded a deferred tax liability related to withholding taxes of $1,471 associated with its undistributed foreign subsidiary earnings.

The Company records interest and penalties related to uncertain tax positions in its consolidated statements of operations and comprehensive (loss) income within other expense. Interest and penalties included in the consolidated statements of operations and comprehensive (loss) income were $249, ($2,012) and $614 for the years ended December 31, 2022, 2021 and 2020, respectively. The Company recorded a liability for interest and penalties of $498 and $248 as of December 31, 2022 and 2021, respectively. As of December 31, 2022, the amount of uncertain tax benefits that, if recognized, would impact the effective income tax rate was $4,313.

The aggregate changes in the balance of gross uncertain tax positions, which excludes interest and penalties, for the years ended December 31, 2022, 2021 and 2020 were as follows:

Balance at December 31, 2019	$ 21,495
Expiration of statute of limitations	(1,174)
Settlement/decreases related to tax positions taken during prior years	(2,815)
Increases related to tax positions taken during prior years	155
Increases related to tax positions taken during the current year	249
Balance at December 31, 2020	17,910
Decreases related to tax positions taken during prior years	(13,510)
Increases related to tax positions taken during prior years	1,190
Increases related to tax positions taken during the current year	402
Balance at December 31, 2021	5,992
Expiration of statute of limitations	(1,506)
Increases related to tax positions taken during prior years	215
Increases related to tax positions taken during the current year	165
Balance at December 31, 2022	$ 4,866

The Company and its subsidiaries file income tax returns in the U.S. federal jurisdiction as well as various states and foreign jurisdictions. The Company and certain subsidiaries have tax years that remain open and are subject to examination by tax authorities in the following major taxing jurisdictions: United States for tax years 2019 through 2022, Ireland for tax years 2018 through 2022, China for tax years 2012 through 2022 and Australia for tax years 2018 through 2022. In addition, U.S. federal tax years from 2014 through 2017 are open to the extent of refund claims associated with CARES Act NOL carrybacks. The Company files income tax returns on a combined, unitary, or stand-alone basis in multiple state and local jurisdictions, which generally have statutes of limitations from three to four years. If any issues addressed in the Company's tax audits are resolved in a manner not consistent with management's expectations, the Company would be required to adjust its provision for income tax in the period such resolution occurs. The Company's unrecognized tax benefits are not anticipated to materially change in the next 12 months.

10. Debt

Term Loan and Revolving Credit Facilities

On December 20, 2016, the Company entered into a credit agreement with JPMorgan Chase Bank, N.A., as administrative agent, various lenders and JPMorgan Chase Bank, N.A. and Barclays Bank PLC providing for (i) a term loan of $300,000 (the "Term Loan") and (ii) a revolving credit facility of up to $25,000 in revolving credit loans and letters of credit.

Current and non-current debt obligations reflected in the consolidated balance sheets as of December 31, 2022 and 2021 consisted of the following:

	December 31,	
	2022	2021
Current liabilities:		
Term loan	$ 226,009	$ 3,000
Unamortized debt issuance costs, current portion	(848)	(1,076)
Current portion of long-term debt, net of unamortized debt issuance costs	$ 225,161	$ 1,924
Non-current liabilities:		
Term loan	$ —	$ 275,225
Unamortized debt issuance costs, non-current portion	—	(1,032)
Long-term debt, net of current portion and unamortized debt issuance costs	$ —	$ 274,193

As of December 31, 2022, aggregate minimum future principal payments of the Company's debt of $226,009 is payable in the year ended December 31, 2023. As of December 31, 2022 and 2021, $226,009 and $278,225 in principal amount, respectively, were outstanding under the Term Loan.

Because the Term Loan matures within one year, there is substantial doubt about the Company's ability to continue as a going concern. The Company will continue to work with potential lenders to refinance the existing debt. See also the Going Concern subsection of Note 1, *Nature of Business and Basis of Presentation*.

Borrowings under the Term Loan bear interest at a floating rate, which can be either a Eurodollar rate plus an applicable margin or, at the Company's option, a base rate (defined as the highest of (x) the JPMorgan Chase, N.A. prime rate, (y) the federal funds effective rate, plus one-half percent (0.50%) per annum and (z) a one-month Eurodollar rate plus 1.00% per annum) plus an applicable margin. The applicable margin for borrowings under the Term Loan is 4.00% per annum for Eurodollar rate loans (subject to a 1.00% per annum interest rate floor) and 3.00% per annum for base rate loans. The interest rates payable under the Term Loan are subject to an increase of 2.00% per annum during the continuance of any payment default.

For Eurodollar rate loans, the Company may select interest periods of one, three or six months or, with the consent of all relevant affected lenders, twelve months. Interest will be payable at the end of the selected interest period, but no less frequently than every three months within the selected interest period. Interest on any base rate loan is not set for any specified period and is payable quarterly. The Company has the right to convert Eurodollar rate loans into base rate loans and the right to convert base rate loans into Eurodollar rate loans at its option, subject, in the case of Eurodollar rate loans, to breakage costs if the conversion is effected prior to the end of the applicable interest period. As of December 31, 2022 and 2021, the interest rate on borrowing under the Term Loan was 8.38% per annum, which was based on a one-month Eurodollar rate of 4.38% plus the applicable margin of 4.00% per annum for Eurodollar rate loans. As of December 31, 2021, the interest rate on borrowings under the Term Loan was 5.00% per annum, which was based on a one-month and six-month Eurodollar rate of 1.00% per annum plus the applicable margin of 4.00% per annum for Eurodollar rate loans.

Upon entering into the Term Loan, the Company incurred debt issuance costs of $7,811, which were initially recorded as a reduction of the debt liability and are being amortized to interest expense using the effective interest method from the issuance date of the Term Loan until the maturity date. The Company made principal payments of $3,000 under the Term Loan during the years ended December 31, 2022 and 2020 and $9,775 under the Term Loan during the year ended December 31, 2021. Interest expense, including the amortization of debt issuance costs, totaled $17,270, $15,519, and $16,493 for the years ended December 31, 2022, 2021 and 2020, respectively.

Additionally, on October 27, 2022, the Company's board of directors authorized the use of up to $50,000 cash to fund the partial repurchase of debt outstanding under the Term Loan. Subsequent to this authorization, the Company repurchased a portion of its outstanding Term Loan from certain of its debt holders. The aggregate payments totaled $45,878, paid using funds included in cash and cash equivalents in the consolidated balance sheets. Based on the applicable fair value of debt repurchased, the amount of outstanding principal of the Term Loan that was retired was $49,216. The Company recognized a gain on extinguishment of debt, net of fees, of $2,728, and also charged $222 to interest expense for the pro-rata portion of unamortized debt issuance costs attributed to the debt repurchased. On January 24, 2023, the Company made an additional payment of $1,237 to repurchase $1,375 of its outstanding debt.

The Term Loan matures on December 20, 2023 and is subject to amortization in equal quarterly installments, which commenced on March 31, 2017, of principal in an annual aggregate amount equal to 1.0% of the original principal amount of the Term Loan of $300,000, with the remaining outstanding balance payable at the date of maturity.

Voluntary prepayments of principal amounts outstanding under the Term Loan are permitted at any time; however, if a prepayment of principal is made with respect to a Eurodollar loan on a date other than the last day of the applicable interest period, the Company is required to compensate the lenders for any funding losses and expenses incurred as a result of the prepayment. Prior to the revolving credit facility maturity date, funds borrowed under the revolving credit facility could have been borrowed, repaid and reborrowed, without premium or penalty.

In addition, the Company is required to make mandatory prepayments under the Term Loan with respect to (i) 100% of the net cash proceeds from certain asset dispositions (including casualty and condemnation events) by the Company or certain of its subsidiaries, subject to certain exceptions and reinvestment provisions, (ii) 100% of the net cash proceeds from the issuance or incurrence of any additional debt by the Company or certain of its subsidiaries, subject to certain exceptions, and (iii) 50% of the Company's excess cash flow, as defined in the credit agreement, subject to reduction upon its achievement of specified performance targets. In accordance with these provisions, based on the results for the year ended December 31, 2020,

a mandatory prepayment of $6,775 was paid on April 2, 2021. Based on results for the year ended December 31, 2022, no mandatory prepayment will be required in 2023.

The Term Loan is secured by, among other things, a first priority security interest, subject to permitted liens, in substantially all of the Company's assets and all of the assets of certain of its subsidiaries and a pledge of certain of the stock of certain of its subsidiaries, in each case subject to specified exceptions. The Term Loan contains customary affirmative and negative covenants, including certain restrictions on the Company's ability to pay dividends, and, with respect to the revolving credit facility which expired on December 20, 2021, a financial covenant requiring the Company to maintain a specified total net leverage ratio in the event that on the last day of any fiscal quarter the Company has utilized more than 30% of its borrowing capacity under the facility. The Company was in compliance with all covenants as of December 31, 2022 and 2021.

Commercial Mortgage Loan

On July 1, 2015, the Company entered into a commercial mortgage loan agreement in the amount of $7,950 (the "Mortgage Loan"). Borrowings under the Mortgage Loan bore interest at a rate of 3.5% per annum and were repayable in 60 monthly installments of $46, consisting of principal and interest based on a 20-year amortization schedule. The remaining amount of unpaid principal under the Mortgage Loan was paid on the maturity date of July 1, 2020 utilizing the Company's revolving credit facility. Upon entering into the Mortgage Loan, the Company incurred debt issuance costs of $45, which the Company initially recorded as a direct deduction from the debt liability and amortized to interest expense using the effective interest method from issuance date of the loan until the maturity date.

The Company made principal payments under the Mortgage Loan of $6,644 during the year ended December 31, 2020. Interest expense, including the amortization of debt issuance costs, totaled $120 for the year ended December 31, 2020.

11. Stockholders' Equity

Stock Repurchase Program

On February 21, 2019, the Company announced a stock repurchase program authorizing it to repurchase up to $75,000 of the Company's common stock. During the years ended December 31, 2022, 2021 and 2020, the Company repurchased 204, 1,671, and 1,227 shares for $1,192, $8,819, and $3,031, respectively, including commissions. As of December 31, 2022, $60,234 remained authorized for repurchases of the Company's common stock under this stock repurchase program. However, based on the Company's net leverage ratio at December 31, 2022, as described in Note 10, *Debt*, the Company's ability to repurchase shares is currently restricted. The stock repurchase program has no expiration date and does not require the Company to purchase a minimum number of shares, and it may suspend, modify or discontinue the stock repurchase program at any time without prior notice.

Securities Purchase Agreement with Verizon Ventures LLC

On April 18, 2022, the Company entered into a Securities Purchase Agreement (the "SPA") with Verizon Ventures LLC providing for the private placement of an aggregate of 9,323 shares (the "Shares") of the Company's common stock, par value $0.001 per share, at a price of $4.24 per share, for an aggregate purchase price of approximately $39,530. Issuance costs related to this transaction totaled $160 and were net against the amount recorded to additional paid in capital on the consolidated balance sheet. The Company filed a resale registration statement for the Shares with the SEC on May 17, 2022.

Special Dividends

The Company's board of directors, on five separate occasions, declared a special dividend to the holders of common stock and preferred stock of record at that time. In connection with these special dividends, the board of directors also approved cash payments to be made to holders of the Company's stock options, SARs and RSUs as equitable adjustments to the holders of such instruments in accordance with the provisions of the Company's equity incentive plans. These equitable adjustment

payments are equal to an amount per share multiplied by the net number of shares subject to outstanding equity awards after applying the treasury stock method. The below table provides details of these equitable adjustment payments:

Dividend Declaration Dates	Equitable Adjustment per share	Year of Final Vesting	Equitable Adjustment Payments During the Year Ended December 31, 2022	December 31, 2021	December 31, 2020
November 30, 2017	$ 0.5802	2021	$ 1	$ 44	$ 148
May 10, 2017	1.1774	2021	—	52	178
December 27, 2016	2.3306	2020	—	2	303
June 17, 2016	0.5891	2020	—	—	54
November 30, 2014	0.3835	2018	—	—	—
Total			$ 1	$ 98	$ 683

(1) Net of estimated forfeitures. Amounts are included in accrued expenses and other current liabilities in the accompanying consolidated balance sheets.

12. Stock-based Compensation

2017 Stock Incentive Plan

The Company's 2017 Stock Incentive Plan (the "2017 Plan"), provides for the Company to grant incentive stock options, nonqualified stock options, SARs, performance-based restricted stock units, or PSUs, restricted stock awards, RSUs, and other stock-based awards. The number of shares of common stock that may be issued under the 2017 Plan will automatically increase on each January 1, beginning with the fiscal year ending December 31, 2019 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2027, equal to the least of (i) 20,000 shares, (ii) 4% of the outstanding shares of common stock on such date and (iii) an amount determined by the Company's board of directors. The shares of common stock underlying any awards that are forfeited, canceled, repurchased or otherwise terminated by the Company under the 2017 Plan will be added back to the shares of common stock available for issuance under the 2017 Plan. The total number of shares authorized for issuance under the 2017 Plan was 19,355 shares as of December 31, 2022, of which 6,051 shares remained available for future grant.

Stock Option Valuation

The Company uses the closing price of its common stock as reported on the Nasdaq Global Select Market on the applicable date of grant to determine the fair value of the shares of common stock underlying stock options.

The assumptions used in the Black-Scholes option-pricing model were as follows:

	Year Ended December 31, 2022	2021	2020
Risk-free interest rate	1.7%–3.7%	1.0%–1.3%	0.4%–0.7%
Expected term (in years)	5.6–6.3	6.1	6.1
Expected volatility	38.5%–42.4%	37.7%–38.6%	29.3%–31.9%
Expected dividend yield	0.0%	0.0%	0.0%

Stock Options

A summary of option activity for the year ended December 31, 2022 is as follows:

	Number of Shares		Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)		Aggregate Intrinsic Value
Outstanding at January 1, 2022	5,919	$	8.82	4.36	$	4,205
Granted	1,592		3.86			
Exercised	(170)		1.92			
Forfeited	(804)		10.77			
Outstanding at December 31, 2022	6,537	$	7.55	4.42	$	134
Options exercisable at December 31, 2022	4,914	$	8.72	2.85	$	132
Vested or expected to vest at December 31, 2022	6,462	$	7.59	4.37	$	134

The weighted-average grant-date fair value of options granted during the years ended December 31, 2022, 2021 and 2020 was $1.62, $2.88, and $1.42 per share, respectively. Cash proceeds received upon the exercise of options were $327, $2,263, and $1,195 during the years ended December 31, 2022, 2021 and 2020, respectively. The intrinsic value of stock options exercised during the years ended December 31, 2022, 2021 and 2020 was $362, $5,594, and $1,746, respectively. The aggregate intrinsic value is calculated as the difference between the exercise price of the stock options and the fair value of the Company's common stock for those stock options that had exercise prices lower than the fair value of the Company's common stock.

Restricted Stock Units

A summary of RSU activity for the year ended December 31, 2022 is as follows:

	Number of Shares		Weighted-Average Grant Date Fair Value		Aggregate Fair Value
Unvested balance at January 1, 2022	4,309	$	6.34		
Granted	3,063		3.51		
Vested	(1,424)		6.46	$	6,363
Forfeited	(443)		6.30		
Unvested balance at December 31, 2022	5,505	$	4.49		

The Company withheld 469, 791, and 150 shares of common stock in settlement of employee tax withholding obligations due upon the vesting of RSUs during the years ended December 31, 2022, 2021 and 2020, respectively.

Performance-Based Restricted Stock Units

During the years ended December 31, 2022 and 2021, the Company granted performance-based restricted stock unit "PSUs" to certain employees that vest over a three-year period based on the achievement of performance goals and continued performance of services. The performance goals for all PSUs granted during the year ended December 31, 2021 and a portion of PSUs granted during the year ended December 31, 2022 consist solely of market-based vesting conditions, determined by the Company's level of achievement of pre-established parameters relating to the performance of the Company's stock price as set by the Company's board of directors. Vesting for these market-based PSUs may occur at any time during the three-year period. The remainder of PSUs granted during the year ended December 31, 2022 consist of performance-based vesting conditions determined by the Company's achievement of performance targets with respect to a certain customer agreement. Vesting for these performance-based PSUs may occur in varying percentages on January 1, 2023, 2024 and 2025.

Compensation expense for PSUs is based on the estimated value of the awards on the grant date, and is recognized over the period from the grant date through the expected vest dates of each vesting condition, both of which were estimated based on a Monte Carlo simulation model applying the following key assumptions:

	Year Ended December 31,	
	2022	2021
Risk-free interest rate	2.8%	0.2%
Volatility	79.1%	78.6%
Dividend yield	0.0%	0.0%
Cost of equity	13.2%	12.0%

A summary of PSU activity for the year ended December 31, 2022 is as follows:

	Number of Shares	Weighted-Average Grant Date Fair Value	Aggregate Fair Value
Unvested balance at January 1, 2022	442	$ 7.89	
Granted	846	2.75	
Vested	—	—	$ —
Forfeited	(26)	7.89	
Unvested balance at December 31, 2022	1,262	$ 4.15	

Stock Appreciation Rights

Over time, the Company has granted SARs that allow the holder the right, upon exercise, to receive in cash the amount of the difference between the fair value of the Company's common stock at the date of exercise and the price of the underlying common stock at the date of grant of each SAR. The SARs vested over a four-year period from the date of grant and expire ten years from the date of grant.

A summary of SAR activity for the year ended December 31, 2022 is as follows:

	Number of Shares	Weighted-Average Grant Date Fair Value
Outstanding at January 1, 2022	200	$ 7.28
Granted	—	—
Vested	(90)	1.69
Forfeited	—	—
Outstanding at December 31, 2022	110	$ 11.86

The fair value of the SAR liability as of December 31, 2021 was $358 (see Note 7, *Fair Value Measurements*), and was included in accrued expenses and other current liabilities in the accompanying condensed consolidated balance sheets. There was no SAR liability as of December 31, 2022 as the exercise price of all outstanding SARs exceeded the fair value of the Company's common stock as of December 31, 2022.

Stock-Based Compensation Expense

The Company classified stock-based compensation expense related to stock options, RSUs, PSUs and SARs for the years ended December 31, 2022, 2021 and 2020 in the consolidated statements of operations and comprehensive (loss) income as follows:

	Year Ended December 31,		
	2022	2021	2020
Cost of revenue	$ 121	$ 137	$ 153
Research and development expenses	2,972	2,665	2,447
Selling, general and administrative	10,188	12,017	10,555
	$ 13,281	$ 14,819	$ 13,155

The Company recognized stock-based compensation expense for the years ended December 31, 2022, 2021 and 2020 in the consolidated balance sheets as follows:

	Year Ended December 31,		
	2022	2021	2020
Change in fair value of SAR liability	$ (159)	$ —	$ 229
Recognized as additional paid-in capital	13,440	14,819	12,926
Total stock-based compensation	$ 13,281	$ 14,819	$ 13,155

As of December 31, 2022, there was $19,348 of unrecognized compensation cost related to outstanding stock options, RSUs, PSUs and SARs, which is expected to be recognized over a weighted-average period of 2.13 years.

13. Net (Loss) Income per Share

The Company calculated basic and diluted net (loss) income per share attributable to common stockholders as follows:

	Year Ended December 31,		
	2022	2021	2020
Numerator:			
Net (loss) income attributable to common stockholders, basic and diluted	$ (79,205)	$ 3,207	$ 24,801
Denominator:			
Weighted-average shares used to compute net (loss) income per share attributable to common stockholders, basic	91,596	85,253	83,465
Dilutive effect of stock options	—	1,526	1,050
Dilutive effect of restricted stock units	—	2,078	763
Weighted-average shares used to compute net (loss) income per share attributable to common stockholders, diluted	91,596	88,857	85,278
Net (loss) income per share attributable to common stockholders:			
Basic	$ (0.86)	$ 0.04	$ 0.30
Diluted	$ (0.86)	$ 0.04	$ 0.29

The Company excluded the following potential common shares, presented based on amounts outstanding at each period end, from the computation of diluted net (loss) income per share attributable to common stockholders for the periods presented because including them would have been anti-dilutive:

	Year Ended December 31,		
	2022	2021	2020
Options to purchase common stock	6,537	3,411	4,119
Unvested restricted stock units	5,505	712	1,030
Unvested performance-based stock units	1,262	—	983

14. Revenue from Contracts with Customers

Disaggregation of revenue

The Company disaggregates its revenue by product and service in the consolidated statements of operations and comprehensive (loss) income. The Company recognizes performance obligations related to product revenue at a point in time, and performance obligations related to service revenue over time. The Company also disaggregates its revenue based on geographic locations of its customers, as determined by the customer's shipping address, summarized as follows:

	Year Ended December 31,		
	2022	2021	2020
North America:			
United States	$ 78,401	$ 154,765	$ 127,217
Canada	52,402	66,537	38,960
Total North America	130,803	221,302	166,177
Latin America	18,357	27,841	34,926
Europe, Middle East and Africa:	38,226	30,378	35,933
Asia-Pacific			
Australia	66,224	89,548	116,661
Other	32,927	32,256	39,549
Total Asia-Pacific	99,151	121,804	156,210
Total revenue(1)	$ 286,537	$ 401,325	$ 393,246

(1) Other than the United States, Canada and Australia, no individual countries represented 10% or more of the Company's total revenue for any of the periods presented.

The Company also disaggregates its revenue based on product line summarized as follows:

	Year Ended December 31,		
	2022	2021	2020
Product revenue:			
Wireless	$ 89,020	$ 170,233	$ 111,255
Fixed-line broadband	57,904	66,017	96,904
Cable	90,623	117,692	137,924
Total product revenue	237,547	353,942	346,083
Service revenue			
Wireless	7,735	5,538	7,348
Fixed-line broadband	3,898	5,034	1,924
Cable	37,357	36,811	37,891
Total service revenue	48,990	47,383	47,163
Total revenue	$ 286,537	$ 401,325	$ 393,246

Costs to Obtain or Fulfill a Contract

As of December 31, 2022, 2021, and 2020, the Company had short-term capitalized contract costs of $124, $90, and $95, respectively, which are included in prepaid expenses and other current assets and had long-term capitalized contract costs of $64, $58, and $70, respectively, which are included in other assets in the accompanying consolidated balance sheets. During the years ended December 31, 2022, 2021, and 2020, amortization expense associated with capitalized contract costs was $168, $98, and $568, respectively, which the Company recorded to selling, general and administrative expenses in the accompanying consolidated statements of operations and comprehensive (loss) income.

Contract Balances

Contract liabilities consist of deferred revenue and include payments received in advance of performance under the contract. The Company recognizes such amounts as revenue when the Company satisfies its performance obligations. For the year ended December 31, 2022, the Company recognized $13,699 of revenue which was included in deferred revenue as of December 31, 2021. For the year ended December 31, 2021, the Company recognized $15,402 of revenue which was included in deferred revenue as of December 31, 2020. For the year ended December 31, 2020, the Company recognized $23,048 of revenue that was included in deferred revenue as of December 31, 2019.

The Company receives payments from customers based upon contractual billing terms. The Company records accounts receivable when the right to consideration becomes unconditional. Contract assets include amounts related to the Company's contractual right to consideration for both completed and partially completed performance obligations that may not have been invoiced. As of December 31, 2022, 2021 and 2020, the Company recorded contract assets of $2,674, $95 and $771, respectively.

Transaction price allocated to the remaining performance obligations

As of December 31, 2022, the aggregate remaining amount of revenue expected to be recognized related to unsatisfied or partially unsatisfied performance obligations was $36,834, which consists of deferred revenue. The Company expects approximately 85% of this amount to be recognized in the next twelve months with the remaining amounts to be recognized over the next two to five years.

15. Segment Information

The Company operates as one operating segment. Operating segments are defined as components of an enterprise for which separate financial information is regularly evaluated by the Company's chief operating decision maker, or decision-making group, in deciding how to allocate resources and assess performance. The Company has determined that its chief operating decision maker is its President and Chief Executive Officer. The Company's chief operating decision maker reviews the Company's financial information on a consolidated basis for purposes of allocating resources and assessing financial performance. Since the Company operates as one operating segment, all required financial segment information can be found in these consolidated financial statements.

Please refer to Note 14, *Revenue from Contracts with Customers,* for the Company's revenue by geography for the years ended December 31, 2022, 2021 and 2020.

The Company's property and equipment, net by location was as follows:

	December 31,	
	2022	2021
United States	$ 14,679	$ 17,089
China	3,017	3,118
Australia	1,054	2,027
Other	768	1,274
Total property and equipment, net	$ 19,518	$ 23,508

16. Related Parties

Employment of Rongke Xie

Rongke Xie, who serves as General Manager of Guangzhou Casa Communication Technology LTD, or Casa China, a subsidiary of the Company, is the sister of Lucy Xie, who served as the Company's Senior Vice President of Operations until her retirement on December 31, 2022 and remains serving as a member of the Company's board of directors. Casa China paid Rongke Xie $216, $224, and $187 in total compensation in the years ended December 31, 2022, 2021 and 2020, respectively, for her services as an employee.

To date, the Company has granted to Rongke Xie 145 RSUs which vest in annual installments over a four-year period. The grant-date fair value of the awards totaled $600, which is recorded as stock-based compensation expense over the vesting period of the awards. During the years ended December 31, 2022, 2021 and 2020, the Company recognized selling, general and administrative expenses of $118, $110, and $90 related to these awards, respectively.

Transactions Involving Verizon Communications Inc. and its Affiliates

As a result of the Company's SPA with Verizon Ventures LLC on April 18, 2022 (see Note 11, *Stockholders Equity*), Verizon Communications Inc. and its subsidiaries, or Verizon and Affiliates, collectively became a principal stockholder of the Company through its ownership of common stock. Verizon and Affiliates are customers of the Company.

During the year ended December 31, 2022, the Company recognized revenue of $18,004 from transactions with Verizon and Affiliates, and amounts received in cash resulting from revenue transactions with Verizon and Affiliates during the year ended December 31, 2022 totaled $29,020. As of December 31, 2022, amounts due from Verizon and Affiliates totaled $6,044 and were included in accounts receivable, net in the consolidated balance sheet. As of December 31, 2022, revenue from transactions that did not meet the criteria for recognition totaling $18,094 with Verizon and Affiliates were included in deferred revenue in the consolidated balance sheet.

17. Leases

The Company leases manufacturing, warehouse and office space in the United States, Ireland, China, Hong Kong, Spain and Australia under non-cancelable operating leases that expire through 2028, as well as various equipment. The leases have remaining lease terms of 1 year to 6 years, some of which contain options to extend the leases for up to 3 years and some which include options to terminate the leases within 1 year. The lease agreements contain lease and non-lease components, which are generally accounted for together.

Prior to adoption of ASC 842 on December 31, 2022, the Company recorded rent expense on a straight-line basis, and, as a result, as of December 31, 2021, the Company had a deferred rent liability of $151 which is included in accrued expenses and other current liabilities in the consolidated balance sheets.

After the adoption of ASC 842, the Company determines if an arrangement is a lease at inception. Operating leases are included in the operating lease right-of-use, or ROU, assets and the short-term and long-term lease liabilities on the consolidated balance sheets. ROU assets represent the Company’s right to use an underlying asset for the lease term and lease liabilities represent the Company's obligation to make lease payments arising from the lease. Operating lease ROU assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. As most of the leases do not provide an implicit rate, the Company used its incremental borrowing rate based on information available at commencement date in determining the present value of lease payments. The operating lease ROU asset also includes any lease payments made and excludes lease incentives. Lease terms may include options to extend or terminate the lease when it is reasonably certain that the Company will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term.

Pursuant to the terms of the lease agreement for the Company’s Australia office, the Company obtained six standby letters of credit in the amount of approximately $2,100 as security on the lease obligation. The letters of credit are classified as restricted cash in the accompanying consolidated balance sheet as of December 31, 2022 and 2021.

The components of lease expense were as follows:

		Year Ended December 31, 2022
Financing lease cost	$	—
Operating lease cost		2,290
Short-term lease cost		2
Variable lease cost		284
Total lease cost	$	2,576

Supplemental cash flow information related to leases was as follows:

		Year Ended December 31, 2022
Cash paid for operating leases included in cash flows from operating activities	$	2,279
Right-of-use assets obtained in exchange for new operating leases		1,077

Supplemental balance sheet information related to leases was as follows:

	Year Ended December 31, 2022
Weighted average remaining lease term for operating leases	3.58 years
Weighted average discount rate for operating leases	4.0%

Maturities of operating lease liabilities were as follows:

Year Ending December 31,		
2023	$	2,186
2024		1,311
2025		955
2026		850
2027		582
Thereafter		2
Total future minimum lease payments	$	5,886
Less: amounts representing interest		(430)
Total lease liabilities		5,456
Less: current operating lease liability		(2,040)
Long term operating lease liability		3,416

In accordance with the transition disclosure requirements under ASC 840, the future minimum lease commitments under non-cancelable leases as of December 31, 2021 were as follows:

Year Ending December 31,		
2022	$	2,138
2023		2,028
2024		1,116
2025		874
2026		795
Thereafter		511
Total	$	7,462

18. Commitments and Contingencies

Indemnification

The Company has, in the ordinary course of business, agreed to defend and indemnify certain customers against third-party claims asserting (i) infringement of certain intellectual property rights, which may include patents, copyrights, trademarks or trade secrets, and (ii) certain other harms caused by the acts or omissions of the Company.

As permitted under Delaware law, the Company indemnifies its officers, directors and employees for certain events or occurrences that happen by reason of their relationship with or position held at the Company.

As of December 31, 2022, the Company accrued $1,487 as a minimum estimated liability related to two ongoing indemnification claims. Both of these claims were settled and paid subsequent to December 31, 2022, in the exact amount estimated of $1,487. As of December 31, 2021, the Company had not experienced any material losses related to these indemnification obligations. As of December 31, 2022 and 2021, no additional material claims were outstanding where a contingent loss was considered to be probable or reasonably estimable. The Company does not expect additional significant claims related to these indemnification obligations and, consequently, concluded that the fair value of any additional obligations is negligible.

Litigation

From time to time, the Company is a party to various litigation matters and subject to claims that arise in the ordinary course of business including, for example, patent infringement lawsuits by non-practicing entities. In addition, third parties may from time to time assert claims against the Company in the form of letters and other communications. The Company is not presently subject to any pending or threatened litigation that it believes, if determined adversely to the Company, individually, or taken together, would reasonably be expected to have a material adverse effect on its business or financial results, except as described below.

Other

As described in Note 6, *Accrued Expenses and Other Current Liabilities*, the Company provides industry-standard product warranties to its customers and is thus inherently subject to loss contingencies that include warranty claims which may arise in the ordinary course of business.

On July 21, 2022, the Company received written notification from a significant customer of one of its international subsidiaries, of alleged costs incurred and expected to be incurred by that customer with respect to an ongoing warranty matter relating to field replacements of failed units for one particular product, which failure was attributable to an unauthorized part substitution in 2019 by a supplier to the subsidiary.

On December 23, 2022, the Company executed a settlement deed with the customer, whereby the Company agreed to, among other things, a settlement amount of 20,000 Australian dollars, to be paid in four equal annual installments, the first of which was paid upon execution of the settlement deed in the amount of $5,000 Australian dollars, or $3,398. As of December 31, 2022, the remaining accrued expense balance, representing the estimated net present value of the remaining payments, plus the estimated cost of other non-monetary obligations under the settlement deed was $9,880, as shown in Note 6, *Accrued Expenses and Other Current Liabilities*. The total expense recognized, net of insurance proceeds, for the year ended December 31, 2022 of $12,803 has been included in cost of revenue in the accompanying statement of operations for the year ended December 31, 2022.

19. Employee Benefit Plan

The Company has a Section 401(k) defined contribution savings plan for its employees. The plan covers substantially all employees in the United States who meet minimum age and service requirements and allows participants to defer a portion of their annual compensation on a pre-tax basis, subject to certain limitations. Company contributions to the plan may be made at the discretion of the Company's board of directors. Effective January 1, 2014, the Company commenced matching contributions in the amount of 50% of the employee’s contributions of up to 6% of eligible wages. The Company made matching contributions to the plan of $1,626, $1,615, and $1,523 in the years ended December 31, 2022, 2021 and 2020, respectively.

20. Subsequent Events

Debt Repurchase

On January 24, 2023, the Company repurchased a portion of its outstanding Term Loan from certain of its debt holders. The aggregate payments totaled $1,237, paid using funds included in cash and cash equivalents in the consolidated balance sheets as of December 31, 2022. Based on the applicable fair value of debt repurchased, the amount of outstanding principal of the Term Loan that was retired was $1,375.

Retirement of Jerry Guo

On March 14, 2023, upon the retirement of the Company's President and Chief Executive Officer, a separation agreement was executed, which provided for the acceleration of any unvested equity awards as of the effective date and a severance package equivalent to one year's base salary plus target bonus, to be paid over twelve months. The total expense to be recognized under the agreement is approximately $4,500.

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

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, has evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a- 15(e) and 15d- 15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act), as of the end of the period covered by this Annual Report on Form 10-K. Our management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and our management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Based on the evaluation of our disclosure controls and procedures as of the end of the period covered by this Annual Report on Form 10-K, our principal executive officer and principal financial officer have concluded that our disclosure controls and procedures were not effective as of December 31, 2022 due to the material weaknesses in our internal control over financial reporting described below.

Notwithstanding the material weaknesses described below, management believes, and our principal executive officer and principal financial officer have certified that, the consolidated financial statements included in this Form 10-K fairly present, in all material respects, our financial condition, results of operations and cash flows as of the dates, and for each of the periods presented, in accordance with accounting principles generally accepted in the United States of America.

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rule 13a-15(f) or 15d-15(f) promulgated under the Exchange Act as a process designed by, or under the supervision of, the company's principal executive and principal financial officers and effected by the company's board of directors, management and other personnel, 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. Internal control over financial reporting includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the company;
- 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
- 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.

Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2022. In making this assessment, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission, or COSO, in Internal Control-Integrated 2013 Framework.

Based on this assessment, our management concluded that, as of December 31, 2022, our internal control over financial reporting was not effective at the reasonable assurance level, due to the material weaknesses outlined below.

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. As of December 31, 2022, management has identified material weaknesses that are pervasive in our internal control processes and involve the control environment, risk assessment, control activity, information and communication, and monitoring components of the COSO framework. Specifically, the material weaknesses relate to: an insufficiently staffed finance organization with the requisite knowledge or skills in and ability to focus on internal control over financial reporting matters; not fully designing, implementing and monitoring policies or financial reporting controls that identify and sufficiently mitigate risks of material misstatement to the financial statements; and insufficient design, implementation and monitoring of general information technology controls to support the effective operation of financial

controls. Because of the material weaknesses described above, our management believes that, as of December 31, 2022, our internal control over financial reporting was not effective.

The Company's independent registered public accounting firm, Ernst & Young LLP, has audited the effectiveness of the Company's internal control over financial reporting as of December 31, 2022. Their report is set forth herein.

Remediation of the Material Weaknesses in Internal Control Over Financial Reporting

Immediately following the identification of the material weaknesses described above, and with the oversight of the Audit Committee, we commenced a process to remediate the underlying causes of these material weaknesses, enhance the control environment and strengthen our internal control over financial reporting. We are committed and are taking steps necessary to remediate the control deficiencies which caused the above material weaknesses by implementing changes to our internal control over financial reporting. We have begun the process to remediate the material weakness and will continue our efforts through fiscal 2023. Our plans for remediation include the following:

- We have added and will continue the process of adding a sufficient number of qualified personnel within our accounting function to establish the appropriate level of resources to ensure successful remediation, and thereafter, ongoing maintenance of adequate internal controls over financial reporting. We have recently hired a new Director of Revenue, and engaged accounting advisory consultants to provide additional oversight and expertise to enhance our period end close, technical accounting, and financial reporting capabilities and will continue to utilize such additional resources as necessary;
- As these resources are added, we will continuously evaluate the assignment of responsibilities, internal and external, associated with the performance of control activities and will continue to consider hiring additional accounting, finance and IT personnel as necessary;
- We will continue delivering training on a regular basis related to internal control over financial reporting to our team members including, but not limited to finance and accounting personnel, to educate control owners and enhance policies to ensure that all design elements of control activities are addressed in the performance of control activities;
- We will continue the process of implementing and/or enhancing control activities, including automating certain manual processes, which is expected to help increase the efficiency of processing transactions and produce accurate and timely information;
- We have engaged third-party consultants to continue to re-assess the Company's control environment and assist with re-designing existing controls and the development of new controls where needed, including Information Technology General Controls. This effort will also include updating and improving existing control documentation as well as developing and performing ongoing and separate evaluations of our internal control environment to ascertain whether the components of internal control are present and functioning at an appropriate level; and
- In addition, under the direction of the audit committee of the Board of Directors, management will continue to review and make necessary changes to the overall design of the Company's internal control environment, as well as to refine and monitor policies and procedures to improve the overall effectiveness of internal control over financial reporting of the Company.

When fully implemented and operational, we believe the measures described above will remediate the material weaknesses we have identified and strengthen our internal control over financial reporting. As we continue to evaluate and work to improve our internal control over financial reporting, our management may determine to take additional measures.

The measures we are implementing are subject to continued management review supported by confirmation and testing, as well as audit committee oversight. Management and the Audit Committee remain committed to the implementation of remediation efforts to address the material weaknesses. We will continue to implement measures to remedy our internal control deficiencies, though there can be no assurance that our efforts will be successful or avoid potential future material weaknesses. In addition, until remediation steps have been completed and are operated for a sufficient period of time, and subsequent evaluation of their effectiveness is completed, the material weakness previously disclosed, and as described above, will continue to exist.

Changes in Internal Control over Financial Reporting

Except as otherwise noted above under "Remediation of Material Weaknesses in Internal Control Over Financial Reporting" including the on-going remediation efforts described, there have been no change in our internal controls over

financial reporting during the fiscal quarter ended December 31, 2022 that has materially affected, or is reasonably likely to materially affect, our internal controls over financial reporting.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Casa Systems, Inc.

Opinion on Internal Control Over Financial Reporting

We have audited Casa Systems, Inc.'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) (the COSO criteria). In our opinion, because of the effect of the material weaknesses described below on the achievement of the objectives of the control criteria, Casa Systems, Inc. (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 weaknesses have been identified and included in management's assessment. Management has identified pervasive material weaknesses throughout the Company's internal control processes that involve the control environment, risk assessment, control activity, information and communication, and monitoring components of the COSO framework.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of Casa Systems, Inc. (the Company) as of December 31, 2022 and 2021, the related consolidated statements of operations and comprehensive (loss) income, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2022, and the related notes. These material weaknesses were 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 15, 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 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

Boston, Massachusetts
March 15, 2023

Item 9B. Other Information.

Retirement of Jerry Guo

On March 14, 2023, the Company announced the transition and retirement of Jerry Guo, the Company's President and Chief Executive Officer, effective March 17, 2023 (the "Effective Date"). Mr. Guo will continue to serve as a director of the Company. Mr. Guo's departure is not the result of any disagreement with the Company on any matters relating to the Company's operations, policies, or practices. The Board has commenced a search process to identify the Company's next Chief Executive Officer.

In connection with his departure, the Company and Mr. Guo entered into a separation agreement and general release of claims (the "Separation Agreement") on March 14, 2023. Pursuant to the terms of the Separation Agreement, for a twelve-month period following the Effective Date, Mr. Guo will receive (i) salary continuation payments in an amount equal to the sum of (x) his annual base salary at the rate in effect as of the Effective Date and (y) his target bonus for the calendar year 2023 (which is equal to two times Mr. Guo's base salary in effect as of the Effective Date) and (ii) payment to the COBRA provider for premiums to continue health benefit coverage. In addition, pursuant to the terms of the Separation Agreement, on the Effective Date, any of Mr. Guo's unvested equity in the Company will be fully accelerated and become vested, and the post-termination exercise period for all stock options held by Mr. Guo will be extended to the earlier of (a) one year following the date upon which Mr. Guo ceases providing services to the Company or (b) the expiration of the option. The Separation Agreement also contains non-disparagement and cooperation covenants, a release of claims by Mr. Guo and a provision reaffirming Mr. Guo's post-employment continuing obligations. The Company's obligations to make payments under the Separation Agreement are conditioned upon Mr. Guo not breaching any of his continuing obligations.

The foregoing description of the Separation Agreement is qualified in its entirety by reference to the full text of the Agreement, which we intend to file as an exhibit to our next Quarterly Report on Form 10-Q.

Appointment of Edward Durkin as Interim Chief Executive Officer

In connection with Mr. Guo's retirement, on March 13, 2023, the Company's Board of Directors appointed Edward ("Ed") Durkin as Interim Chief Executive Officer ("Interim CEO"), effective as of the Effective Date. Mr. Durkin currently serves, and will continue to serve, as the Company's Chief Financial Officer. There is no employment agreement between the Company and Mr. Durkin in connection with his newly appointed role as Interim CEO. Mr. Durkin has agreed that he will not receive any salary, compensation, or benefits for his service as Interim CEO at this time. However, Mr. Durkin will continue to receive a salary, compensation, and benefits in his role as Chief Financial Officer of the Company.

Mr. Durkin, age 62, currently serves as the Company's Chief Financial Officer. Prior to joining the Company in March 2022, Mr. Durkin had served as the chief financial officer of Fuze, Inc., a global, enterprise-focused provider of unified cloud-based communications software, that was acquired by 8x8, Inc., since December 2020. Prior to Fuze, Mr. Durkin served as chief financial officer at Actifio Inc., Inc., a multi-cloud copy data management software company serving enterprise and global service provider customers which was acquired by Google, from January 2018 to December 2020. Prior to Actifio, Mr. Durkin served as chief financial officer at Digital Guardian, Inc., a data loss prevention software provider, from June 2015 to January 2018. Mr. Durkin received a B.S. in Accounting from the University of Massachusetts Dartmouth.

There are no family relationships between Mr. Durkin and any director or executive officer of the Company, and the Company has not entered into any transactions with Mr. Durkin that are reportable pursuant to Item 404(a) of Regulation S-K. Except as described above, there are no arrangements or understandings between Mr. Durkin and any other persons pursuant to which he was appointed as Interim Chief Executive Officer.

Election of Scott Bruckner as Director

On March 13, 2023, the Board voted to increase the size of the Board from seven to eight directors and, upon the recommendation of its independent members, appointed Scott Bruckner to fill the newly created vacancy, effective immediately. Mr. Bruckner was designated as a Class III director in accordance with the Company's Restated Certificate of Incorporation and Amended and Restated Bylaws to serve until the Company's 2023 Annual Meeting of Stockholders and thereafter until his successor has been duly elected and qualified, or until his earlier death, resignation or removal.

Mr. Bruckner has served as the chief financial officer of Fluid Truck Inc. since April 2022. Prior to that, he served as Casa Systems' Chief Financial Officer from January 2020 until April 2022, and as the Company's Senior Vice President of Strategy and Corporate Development from November 2017 until January 2020. Prior to joining Casa Systems, Mr. Bruckner served as a senior managing director of Macquarie Group from June 2015 to November 2017 and as a partner at Perella Weinberg Partners from April 2007 to May 2015. Mr. Bruckner holds a B.A. in international relations and Slavic languages and literature from the University of Southern California and an M.A. and a Ph.D. in political science and political economy from the University of California, Los Angeles.

Mr. Bruckner will be entitled to receive compensation for his service as a non-employee director in accordance with the Company's non-employee director compensation program described in the Company's Proxy Statement filed with the Securities and Exchange Commission on April 1, 2022.

There are no family relationships between Mr. Bruckner and any director or executive officer of the Company, and there are no arrangements or understandings between Mr. Bruckner and any other person pursuant to which he was elected as a director. There are no transactions in which Mr. Bruckner has an interest requiring disclosure under Item 404(a) of Regulation S-K.

Mr. Bruckner plans to enter into an indemnification agreement with the Company, in the form filed as Exhibit 10.1 to the Company's Registration Statement on Form S-1 (File No. 333-221658), filed with the Securities and Exchange Commission on November 17, 2017. Pursuant to the terms of this agreement, the Company may be required, among other things, to indemnify Mr. Bruckner for certain expenses, including attorneys' fees, judgments, fines and settlement amounts incurred by him in any action or proceeding arising out of his service as a director of the Company.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The complete response to this Item regarding the backgrounds of our executive officers and directors and other information required by this Item is expected to be incorporated by reference herein to our definitive proxy statement for our 2023 Annual Meeting of Stockholders.

Code of Business Conduct and Ethics

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. A copy of the code is available on our website, www.casa-systems.com. In addition, we intend to post on our website all disclosures that are required by law or the Nasdaq Listing Rules concerning any amendments to, or waivers from, any provision of the code.

Item 11. Executive Compensation

The information required by this Item is expected to be incorporated by reference herein to our definitive proxy statement for our 2023 Annual Meeting of Stockholders.

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

The information required by this Item is expected to be incorporated by reference herein to our definitive proxy statement for our 2023 Annual Meeting of Stockholders.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this Item is expected to be incorporated by reference herein to our definitive proxy statement for our 2023 Annual Meeting of Stockholders.

Item 14. Principal Accounting Fees and Services

The information required by this Item is expected to be incorporated by reference herein to our definitive proxy statement for our 2023 Annual Meeting of Stockholders.

PART IV

Item 15. Exhibits and Financial Statement Schedules.

(l) Financial Statements

Our consolidated financial statements are set forth in Part II, Item 8 of this Annual Report on Form 10-K and are incorporated herein by reference.

(2) Financial Statement Schedules

All financial schedules have been omitted because the required information is either presented in the consolidated financial statements or the notes thereto or is not applicable or required.

(3) Exhibits

		Incorporated by Reference				
Exhibit Number	Description of Exhibit	Form	File No.	Date of Filing	Exhibit Number	Filed Herewith
2.1	Deed, dated as of February 21, 2019, between Casa Systems, Inc. and NetComm Wireless Limited	8-K	001-38324	2/21/2019	10.1	
3.1	Restated Certificate of Incorporation of the Registrant	8-K	001-38324	12/19/2017	3.1	
3.2	By-laws of the Registrant	8-K	001-38324	12/19/2017	3.2	
4.1	Specimen Stock Certificate evidencing the shares of common stock	S-1/A	333-221658	12/4/2017	4.1	
4.2	Description of Securities of the Registrant	10-K	001-38324	2/27/2020	4.2	
10.1#	Form of Indemnification Agreement between the Registrant and its executive officers and directors	S-1	333-221658	11/17/2017	10.1	
10.2#	2011 Stock Incentive Plan, as amended	S-1	333-221658	11/17/2017	10.6	
10.3#	Form of Incentive Stock Option Agreement under 2011 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.7	
10.4#	Form of Nonstatutory Stock Option Agreement under 2011 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.8	
10.5#	Form of Restricted Stock Agreement under 2011 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.9	
10.6#	Form of Restricted Stock Unit Agreement under 2011 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.10	
10.7#	Form of Stock Appreciation Rights Agreement under 2011 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.11	
10.8#	2017 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.12	
10.9#	Form of Stock Option Agreement under 2017 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.13	
10.10#	Form of Restricted Stock Unit Agreement under 2017 Stock Incentive Plan	S-1	333-221658	11/17/2017	10.14	
10.11	Registration Rights Agreement, dated April 26, 2010, between the Registrant and the investors party thereto	S-1	333-221658	11/17/2017	10.19	
10.12	Credit Agreement, dated as of December 20, 2016, by and among the Registrant and JPMorgan Chase Bank, N.A., as agent, and the other agents, arrangers and lenders party thereto	S-1	333-221658	11/17/2017	10.20	
10.13	Letters, dated as of February 1, 2017 and April 14, 2017, from the Registrant to the lenders party to the Credit Agreement	S-1	333-221658	11/17/2017	10.21	
10.14	Security Agreement, dated as of December 20, 2016, by and among the Registrant, each of the subsidiaries of the Registrant party thereto, and JPMorgan Chase Bank, N.A., as Collateral Agent	S-1	333-221658	11/17/2017	10.22	
10.15#	Employment Agreement, dated November 17, 2017, by and between the Registrant and Jerry Guo	S-1	333-221658	11/17/2017	10.24	
10.16#	Employment Agreement, dated November 17, 2017, by and between the Registrant and Lucy Xie	S-1	333-221658	11/17/2017	10.25	
10.17#	Employment Agreement, dated November 17, 2017, by and between the Registrant and Weidong Chen	S-1	333-221658	11/17/2017	10.26	
10.18#	Offer Letter, dated October 10, 2017, by and between the Registrant and Scott Bruckner	10-K	001-38324	2/27/2020	10.28	
10.19#	Form of Performance Restricted Stock Unit Agreement with Full Acceleration under 2017 Stock Incentive Plan	10-Q	001-38324	5/1/2020	10.2	

10.20#	Form of Performance Restricted Stock Unit Agreement with Partial Acceleration under 2017 Stock Incentive Plan	10-Q	001-38324	5/1/2020	10.3	
10.21	Lease annexure “A”, dated October 29, 2020, between ESR Investment Nominees 3 (Australia) Pty Limited and NetComm Wireless Pty Ltd	10-Q	001-38324	10/29/2020	10.2	
10.22#	Offer Letter, dated March 2, 2022, by and between the Registrant and Ed Durkin	8-K	001-38324	3/24/2022	10.1	
10.23	Securities Purchase Agreement, dated as of April 18, 2022, among Casa Systems, Inc. and Verizon Ventures LLC	8-K	001-38324	4/18/2022	10.1	
10.24#	Form of Restricted Stock Unit Agreement under 2017 Stock Incentive Plan	10-Q	001-38324	8/4/2022	10.1	
10.25#	Separation Agreement, executed on November 29, 2022, by and between the Company and Lucy Xie	8-K	001-38324	12/5/2022	10.1	
21.1	Subsidiaries of the Registrant					X
23.1	Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm					X
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
32.1*	Certification of Principal Executive Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					
32.2*	Certification of Principal Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.					
101.INS	Inline XBRL Instance Document – the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document					
101.SCH	Inline XBRL Taxonomy Extension Schema Document					
101.CAL	Inline XBRL Taxonomy Extension Calculation Linkbase Document					
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase Document					
101.LAB	Inline XBRL Taxonomy Extension Label Linkbase Document					
101.PRE	Inline XBRL Taxonomy Extension Presentation Linkbase Document					
104	Cover Page Interactive Data File (formatted as inline XBRL with applicable taxonomy extension information contained in Exhibits 101)					

Management contracts or compensatory plans or arrangements required to be filed as an exhibit hereto pursuant to Item 15(b) of Form 10-K.

* Furnished herewith.

Item 16. Form 10-K Summary.

Not applicable.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, as amended, the Registrant has duly caused this Report to be signed on its behalf by the undersigned, thereunto duly authorized, in the Town of Andover, Commonwealth of Massachusetts, on this 15th day of March, 2023.

CASA SYSTEMS, INC.

By: /s/ Jerry Guo
Jerry Guo
President, Chief Executive Officer and Director

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

Name	Title	Date
/s/ Jerry Guo **Jerry Guo**	President, Chief Executive Officer and Director (Principal Executive Officer)	March 15, 2023
/s/ Edward Durkin **Edward Durkin**	Chief Financial Officer (Principal Financial Officer)	March 15, 2023
/s/ Matthew Slepian **Matthew Slepian**	Chief Accounting Officer (Principal Accounting Officer)	March 15, 2023
/s/ Scott Bruckner **Scott Bruckner**	Director	March 15, 2023
/s/ Susana D'Emic **Susana D'Emic**	Director	March 15, 2023
/s/ Bruce R. Evans **Bruce R. Evans**	Chairman and Director	March 15, 2023
/s/ Michael T. Hayashi **Michael T. Hayashi**	Director	March 15, 2023
/s/ Daniel S. Mead **Daniel S. Mead**	Director	March 15, 2023
/s/ Bill Styslinger **Bill Styslinger**	Director	March 15, 2023
/s/ Lucy Xie **Lucy Xie**	Director	March 15, 2023