RAMBUS INC
Form 10-K
February 22, 2019
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UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-K

(Mark One)

| | |
|---|---|
| þ | ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934<br>For the fiscal year ended December 31, 2018<br>or |
| o | TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934<br>For the transition period from to |

Commission file number: 000-22339

RAMBUS INC.
(Exact name of registrant as specified in its charter)

| | |
|---|---|
| Delaware | 94-3112828 |
| (State or other jurisdiction of incorporation or organization) | (I.R.S. Employer Identification Number) |

| | |
|---|---|
| 1050 Enterprise Way, Suite 700 | |
| Sunnyvale, California | 94089 |
| (Address of principal executive offices) | (Zip Code) |

Registrant's telephone number, including area code:
(408) 462-8000

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

| Title of Each Class | Name of Each Exchange on Which Registered |
|---|---|
| Common Stock, $.001 Par Value | The NASDAQ Stock Market LLC<br>(The NASDAQ Global Select Market) |

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

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes þ No o

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes o No þ

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 þ No o

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes þ No o

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. o

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 þ Accelerated filer ¨ Non-accelerated filer ¨ Smaller reporting company ¨
Emerging growth company o

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act. o

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

The aggregate market value of the Registrant's Common Stock held by non-affiliates of the Registrant as of June 30, 2018 was approximately $1.0 billion based upon the closing price reported for such date on The NASDAQ Global Select Market. For purposes of this disclosure, shares of Common Stock held by officers and directors of the Registrant and persons that may be deemed to be affiliates under the Act have been excluded. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

The number of outstanding shares of the Registrant's Common Stock, $.001 par value, was 109,042,945 as of January 31, 2019.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information is incorporated into Part III of this report by reference to the Proxy Statement for the Registrant's annual meeting of stockholders to be held on or about April 25, 2019 to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Form 10-K.

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NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K ("Annual Report on Form 10-K") contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. These forward-looking statements include, without limitation, predictions regarding the following aspects of our future:

- Success in the markets of our products and services or our customers' products;
- Sources of competition;
- Research and development costs and improvements in technology;
- Sources, amounts and concentration of revenue, including royalties;
- Success in signing and renewing license agreements;
- Terms of our licenses and amounts owed under license agreements;
- Technology product development;
- Dispositions, acquisitions, mergers or strategic transactions and our related integration efforts;
- Impairment of goodwill and long-lived assets;
- Pricing policies of our customers;
- Changes in our strategy and business model, including the expansion of our portfolio of inventions, products, software, services and solutions to address additional markets in memory, chip, mobile payments, smart ticketing and security;
- Deterioration of financial health of commercial counterparties and their ability to meet their obligations to us;
- Effects of security breaches or failures in our or our customers' products and services on our business;
- Engineering, sales and general and administration expenses;
- Contract revenue;
- Operating results;
- International licenses, operations and expansion;
- Effects of changes in the economy and credit market on our industry and business;
- Ability to identify, attract, motivate and retain qualified personnel;
- Effects of government regulations on our industry and business;
- Manufacturing, shipping and supply partners and/or sale and distribution channels;
- Growth in our business;
- Methods, estimates and judgments in accounting policies;
- Adoption of new accounting pronouncements, including adoption in 2018 of the new revenue recognition standard on our financial position and results of operations;
- Effective tax rates, including as a result of the new U.S. tax legislation;
- Restructurings and plans of termination;
- Realization of deferred tax assets/release of deferred tax valuation allowance;
- Trading price of our common stock;
- Internal control environment;
- The level and terms of our outstanding debt and the repayment or financing of such debt;
- Protection of intellectual property;
- Any changes in laws, agency actions and judicial rulings that may impact the ability to enforce intellectual property rights;
- Indemnification and technical support obligations;
- Equity repurchase plans;
- Issuances of debt or equity securities, which could involve restrictive covenants or be dilutive to our existing stockholders;
- Effects of fluctuations in currency exchange rates;

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- Outcome and effect of potential future intellectual property litigation and other significant litigation; and
- Likelihood of paying dividends.

You can identify these and other forward-looking statements by the use of words such as “may,” “future,” “shall,” “should,” “expects,” “plans,” “anticipates,” “believes,” “estimates,” “predicts,” “intends,” “potential,” “continue,” “projecting” or the neg terms, or other comparable terminology. Forward-looking statements also include the assumptions underlying or relating to any of the foregoing statements.

Actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth under Item 1A, “Risk Factors.” All forward-looking statements included in this document are based on our assessment of information available to us at this time. We assume no obligation to update any forward-looking statements.

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PART I
Rambus and CryptoManager$^{TM}$ are trademarks or registered trademarks of Rambus Inc. Other trademarks or copyrights that may be mentioned in this Annual Report on Form 10-K are the property of their respective owners.

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Item 1. Business

Dedicated to making data faster and safer, Rambus is a leading semiconductor company that creates innovative hardware, software and services that drive technology advancements across the data center, edge and connected end points. Our architecture licenses, IP cores, chips, software, and services span memory and interfaces, embedded security, and key management technologies to positively impact the modern world. We collaborate with the industry, partnering with leading chip and system designers, foundries, and service providers. Integrated into a wide array of devices and systems, our products power and secure diverse applications, including data center and networking, artificial intelligence and machine learning, IoT, and automotive.

Building upon the foundation of technologies for memory, SerDes and other chip interfaces, we have expanded our portfolio of inventions and solutions to address chip and system security, as well as device provisioning and key management. We intend to continue our growth in leading-edge, high-growth markets, consistent with our mission to create value through our innovations and to make those technologies available through the shipment of products, the delivery of services, and licensing business models. Key to our efforts is continuing to hire and retain world-class inventors, scientists and engineers to lead the development and deployment of inventions and technology solutions for our fields of focus.

Rambus is aligning the research priorities in Rambus Labs on innovation and patent development in these key areas as well. Our patents remain foundational to our industry. By reinforcing our commitment to invention and advancing semiconductor technology, we enhance our value and relevance in our target markets and create a platform for investment in product development. Our inventions and technology solutions are offered to our customers through patent, technology, software and IP core licenses, as well as product sales and services. Today, our primary source of revenue is derived from patent licenses, through which we provide our customers a license to use a certain portion of our broad portfolio of patented inventions. Royalties from licenses accounted for 56%, 74% and 79% of our consolidated revenue for the years ended December 31, 2018, 2017 and 2016, respectively.

Our strategy is to optimize the company for operational efficiency and profitability, leveraging synergies across our businesses and customer base. There is significant overlap in our ecosystem of customers, partners and influencers. By focusing on hardware and software solutions for secure, connected semiconductors, we are able to bring better value to our customers and improved profitability for the company.

We demonstrated execution across our product teams in 2018, with record annual product revenue for our IP cores and server DIMM chipsets. Our DDR4 server DIMM chipset continues to gain market share for the current generation server platform and we anticipate even greater market share on the upcoming CPU refresh as we have more than twice the number of OEM and data center qualifications versus the previous generation. In addition to the steady growth in DDR4, we maintained our leadership position for next-generation DDR5 server DIMM chips as the first supplier with silicon at the top-end speeds for both the Register Clock Driver (RCD) and Data Buff (DB) chips.

We continued our leadership position in high-end and high-bandwidth SerDes and memory IP cores in advanced process nodes with the tape out of the industry’s first GDDR6 memory PHY in a leading-edge process node. As demand for high memory bandwidth extends beyond graphics, we see expanding customer engagement in a wide range of high-performance applications.

Turning to our Cryptography business, 2018 saw the importance of semiconductor device-level security grow in the industry, resulting in increased traction and opportunities for our embedded security cores and provisioning capabilities in market segments like IoT, automotive, networking and government. We launched the programmable CryptoManager Root of Trust, which combines our deep security expertise with a modern open architecture, RISC-V, to create an easy-to-consume, secure processing core and have ongoing engagements with semiconductor manufacturers, OEMs and cloud providers. We believe our CryptoManager programmable, secure core and provisioning platform will play an increasingly important role in securing special-purpose computing use cases at the edge, driving increased customer interest across our target segments including automotive, artificial intelligence, machine learning, and government.

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Organization

We have organized our business into three operational units:

- Memory and Interfaces (MID)
- Security (RSD)
- Emerging Solutions (ESD)

As of December 31, 2018, MID and RSD met quantitative thresholds for disclosure as reportable segments. Results for the remaining operating segments are shown under “Other.” For additional information concerning segment reporting, see Note 6, “Segments and Major Customers,” of Notes to Consolidated Financial Statements of this Form 10-K.

Memory and Interfaces

The Rambus Memory and Interfaces Division develops IP cores and memory buffer chips that solve the power, performance, and capacity challenges of the communications and data center computing markets. Rambus standards-compatible memory and SerDes solutions include server DIMM memory interface chips, architectures, and IP cores for high-speed memory and SerDes interfaces. Developed through our system-aware design methodology, Rambus products deliver leading-edge performance with improved time-to-market and first-time-right quality.

As data rates continue to rise to meet that growing demands for faster data delivery, it becomes increasingly difficult to maintain signal integrity and power efficiency at the speeds required to support more powerful, multi-core processors. To address these challenges and enable the continued improvement of electronics systems, ongoing innovation is required. The many contributions and patented innovations developed by Rambus scientists and engineers have been, and continue to be, critical in addressing some of the most difficult chip and system challenges. The foundations of the Memory and Interfaces Division are world-class memory architectures and high-performance SerDes technologies that are brought to market through three main business initiatives: (1) patent licensing; (2) silicon IP core licensing; and (3) chipsets.

Patent Licensing

Our traditional patent licensing program remains our primary source of revenue. Our patent licenses provide our customers a license to use a certain portion of our portfolio of patented inventions in the customer’s own digital electronics products, systems or services. The licenses may also define the specific field of use where our customers may use or employ our inventions in their products. License agreements are structured with fixed, variable or a hybrid of fixed and variable royalty payments over certain periods ranging up to ten years. Leading consumer product, industrial, semiconductor and system companies such as AMD, Broadcom, Cisco, Freescale, Fujitsu, GE, IBM, Intel, LSI, Micron, Nanya, NVIDIA, Panasonic, Qualcomm, Renesas, Samsung, SK hynix, STMicroelectronics, Toshiba, Western Digital, Winbond and Xilinx have licensed our patents for use in their own products. The vast majority of our patents were secured through our internal research and development efforts across all of our business units.

Silicon IP Core Licensing

Our IP core licensing program offers a suite of high-speed memory and SerDes PHY solutions designed to meet the growing performance needs of data center, networking, communications, machine learning and automotive. Due to the complex nature of implementing our technologies, we provide engineering services under certain of these licenses to help our customers successfully integrate our technology solutions into their semiconductor and system products. Licensees may also receive, in addition to their license agreements, patent licenses as necessary to implement the technology in their products with specific rights and restrictions to the applicable patents elaborated in their individual contracts. Our solutions are designed into systems bought by OEMs. We license both directly to ASIC design houses and semiconductor foundries that, in turn, sell to OEMs, or to OEMs directly.

Chip Sets

Made for high speed, reliability and power efficiency, our DDR memory buffer chipsets for RDIMM, LRDIMM and NVDIMM server modules deliver top-of-the-line performance and capacity for the next wave of enterprise and data center servers. Rambus offers DDR3 and DDR4 server DIMM chipsets to enable increased memory capacity, while maintaining peak

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performance for data-intensive work loads. We are the first provider to offer a silicon-proven server DIMM buffer chipset including both the RCD and DB capable of achieving the speeds expected for next-generation DDR5.

We sell our semiconductor products directly and indirectly to module manufacturers and OEMs worldwide through multiple channels, including our direct sales force and distributors. We operate direct sales offices in the United States, Japan, Korea, Taiwan, China, and employ sales personnel that cover our direct customers and manage our channel partners.

We operate a fabless business model and use third-party foundries and assembly and test manufacturing contractors to manufacture, assemble and test our semiconductor products. We also inspect and test parts in our U.S. based facilities. This outsourced manufacturing approach allows us to focus our resources on the design, sale and marketing of our products. Outsourcing also allows us the flexibility needed to respond to new market opportunities, simplifies our operations and significantly reduces our capital requirements.

Security

Rambus Security is dedicated to providing a secure foundation for a connected world. Our innovative solutions include embedded secure cores, software, and key provisioning, spanning areas including tamper-resistant electronic devices and systems, network security, mobile payment, smart ticketing and trusted transaction services. Rambus' foundational technologies protect a substantial amount of licensed products annually, providing secure access to data and creating an economy of digital trust between our customers and their customer base.

Security challenges are increasingly prevalent in a multitude of industries, including high-growth sectors such as mobile, Internet of Things (IoT), automotive and the data center, providing a variety of opportunities for our security technologies and services. We believe robust security starts with the design of the SoC and continues through the manufacturing supply chain to end-user applications. In line with this thinking, RSD offers a suite of products and services from DPA countermeasures and cores to our CryptoManager™ Platform, mobile payments and smart ticketing.

DPA Countermeasures and Cores

We own a portfolio of patented inventions and technology solutions that are needed for creating secure tamper-resistant electronic devices and systems. These patented DPA countermeasures are critical in protecting devices against side channel attacks such as differential power analysis, which involve monitoring the variations in power consumption or electromagnetic emissions of a device. In addition, our hardware-based cores provide a robust hardware-based solution to protect electronics systems from side-channel attacks, counterfeiting, piracy, and other forms of attack.

For DPA countermeasures, our business model is to provide a combination of patent licenses, technology, consulting services (training, evaluation, and design), and test equipment as well as DPA resistant cores and software libraries. We are recognized worldwide for our expertise in this area, and our strategy is to strengthen our offering beyond stand-alone patent licensing. We discovered the existence of SPA and DPA vulnerabilities in the 1990s, and patented the fundamental techniques for preventing against this method of attack. DPA protections are a critical security ingredient in tamper-resistant products, and are important or required for a broad range of applications and devices (including smart cards, mobile devices, FPGAs, government/defense applications, consumer set-top boxes, postage meters and security tokens).

In addition to the DPA countermeasures portfolio, we have developed technologies, expertise, advanced designs, and development tools for building highly secure cryptographic semiconductor cores. We have successfully deployed our semiconductor cores in two primary application areas where effective security is valued and paid for by customers: content protection and anti-counterfeiting.

CryptoManager Platform

As the amount of valuable data stored and communicated across devices continues to grow in the mobile, automotive and IoT segments, the need for robust security services is becoming increasingly necessary. Robust security starts with the design of the SoC and continues with the manufacturing supply chain. The Rambus CryptoManager Platform includes a hardware root of trust, key provisioning, software and hosted security services, capable of supporting a variety of configurations via a hardware core or secure software, to provide a scalable and flexible security solution for chip-to-cloud-to-crowd security.

The CryptoManager platform provides chip and device companies with an advanced hardware root-of-trust for their SoCs, as well as an Infrastructure Suite for end-to-end security throughout the SoC design and manufacturing process. The

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CryptoManager platform has been developed with a services-based architecture that enables a secure, two-way communication channel across the manufacturing stages. This extensible solution is built on a foundation that simplifies, automates, and reduces costs for global enterprise IT, manufacturing, and operations functions. The platform is designed to support the enablement of in-field provisioning and hosted security services.

Mobile Payments

Tokenization technology and software continues to expand beyond card and mobile EMV payments to ecommerce, account-to-account and blockchain transactions to reduce fraud and improve trust. NFC-based mobile payments offer many advantages to consumers, retailers and financial institutions alike. For consumers, mobile wallets provide a convenient, “tap-and-go” frictionless commerce experience, seamlessly integrating credit cards, loyalty points and gift cards, while leveraging enhanced security features like multi-factor authentication and biometrics. For retailers, mobile wallets offer businesses the ability to engage users with an immersive, “in-app” experience that bridges the gap from digital to physical with profile-based shopping to offer customized recommendations and coupons to customers. Finally, for banks and retailers, mobile wallets enhance protection from fraud and greater customer engagement and loyalty, and blockchain tokenization protects a broad range of financial services leveraging blockchain technology including cryptocurrency transactions and trading.

Our technology adapts to any mobile payments ecosystem - whether card credentials are stored on the device or in the cloud using host card emulation - and ensures security through tokenization. With our software, customers can fulfill the role of a token service provider, securing transactions by removing vulnerable card data from the payment network. Our mobile payment solutions are offered to financial institutions and retailers through software license agreements.

Smart Ticketing

Smart ticketing is changing the way people travel by bringing greater convenience and security to travelers and transport operators alike. Through the use of smart cards and smart phones, travelers can download and store their tickets electronically, eliminating the need for ticket vending machines and paper tickets, enabling users to simply tap their smart card or device on a gate or validator to access their travel. Our smart ticketing technology combines back-office processing and analytics systems with web portals, smart cards and mobile applications to deliver comprehensive solutions to transport operators and local authorities. Data analytics enable improved profitability and optimization of smart transport schemes through access to real-world travel data, with easy management of transaction data to ensure accurate reimbursements. ITSO certified and interoperable with existing transport providers, our smart ticketing solutions are easy to integrate across multiple modes of travel, simplifying customer journeys at lower cost. Currently, our smart ticketing solutions are primarily offered to public transit authorities in the United Kingdom and we are working to expand our offerings into the broader international markets.

Emerging Solutions

ESD encompasses our long-term research and development efforts in emerging technologies, primarily focused on next-generation memory solutions. ESD programs are generally at the research and pre-commercial stages and may involve collaboration with government entities, universities and industry partners.

Lighting

On January 30, 2018, we announced our plans to close our lighting division and manufacturing operations in Brecksville, Ohio. We believe that such business was not core to our strategy and growth objectives. As of December 31, 2018, the lighting division has been wound down. Refer to Note 15, “Restructuring Charges” of Notes to

Consolidated Financial Statements of this Form 10-K for additional details.

## Competition

Our industries are intensely competitive and have been impacted by rapid technological change, short product life cycles, cyclical market patterns, price erosion, increasing foreign and domestic competition and market consolidation. We believe the principal competition for our technologies may come from our prospective customers, some of whom are evaluating and developing products based on technologies that they contend or may contend will not require a license from us. Some of our competitors use a system-level design approach similar to ours, including activities such as board and package design, power and signal integrity analysis, and thermal management. Many of these companies are larger and may have better access to financial, technical and other resources than we possess.

To the extent that alternatives might provide comparable system performance at lower or similar cost to our technologies are perceived to require the payment of no or lower royalties, or to the extent other factors influence the industry, our customers and prospective customers may adopt and promote alternative technologies. Even to the extent we determine that such alternative technologies infringe our patents, there can be no assurance that we would be able to negotiate agreements that would result in royalties being paid to us without litigation, which could be costly and the results of which would be uncertain. In the past, litigation has been and in the future may be required to enforce and protect our intellectual property rights, as well as the substantial investments undertaken to research and develop our innovations and technologies.

Research, Development and Employees

Our growth strategy will be substantially dependent on our ability to develop key innovations that meet the future needs of a dynamic market. To this end, we continue to invest substantial funds in research and development and have assembled a team of highly skilled inventors, engineers and scientists whose activities are focused on continually developing new innovations within our chosen technology fields. Using this foundation of innovations, our technical teams develop new solutions that enable increased performance, greater power efficiency, increased levels of security, as well as other improvements and benefits. Our solution design and development process is a multi-disciplinary effort requiring expertise in multiple fields across all of our operational units.

As of December 31, 2018, we had approximately 560 employees in our engineering departments, representing approximately 70% of our total number of 796 employees. None of our employees are covered by collective bargaining agreements. As noted, we believe our future success is dependent on our continued ability to identify, attract, motivate and retain qualified personnel. In order to attract qualified employees, we have created an environment and culture that encourages, fosters and supports research, development and innovation in breakthrough technologies with significant opportunities for broad industry adoption. To date, we believe we have been successful in recruiting qualified employees and that we have a good relationship with our employees.

A significant number of our scientists and engineers spend all or a portion of their time on research and development. For the years ended December 31, 2018, 2017 and 2016, research and development expenses were $158.3 million, $149.1 million and $129.8 million, respectively. We expect to continue to invest substantial funds in research and development activities. In addition, because our customer agreements often call for us to provide engineering support, a portion of our total engineering costs are allocated to the cost of contract and other revenue.

Intellectual Property

We maintain and support an active program to protect our intellectual property, primarily through the filing of patent applications and the defense of issued patents against infringement. As of December 31, 2018, our technologies are covered by 2,094 U.S. and foreign patents, having expiration dates ranging from 2019 to 2037. Additionally, we have 557 patent applications pending. Some of the patents and pending patent applications are derived from a common parent patent application or are foreign counterpart patent applications. We believe our patented innovations provide our customers with the ability to achieve improved performance, lower risk, greater cost-effectiveness and other benefits in their products and services.

We have a program to file applications for and obtain patents in the United States and in selected foreign countries where we believe filing for such protection is appropriate and would further our overall business strategy and objectives. In some instances, obtaining appropriate levels of protection may involve prosecuting continuation and counterpart patent applications based on a common parent application. In addition, we attempt to protect our trade secrets and other proprietary information through agreements with current and prospective customers, and confidentiality agreements with employees and consultants and other security measures. We also rely on copyright, trademarks and trade secret laws to protect our intellectual property.

Backlog

Our product sales are generally made pursuant to short-term purchase orders. These purchase orders are made without deposits and may be, and often are, rescheduled, canceled or modified on relatively short notice, without substantial penalty. Therefore, we believe that purchase orders or backlog are not necessarily a reliable indicator of our future product sales.

Corporate and Other Information

Rambus Inc. was founded in 1990 and reincorporated in Delaware in March 1997. Our principal executive offices are located at 1050 Enterprise Way, Suite 700, Sunnyvale, California. Our website is www.rambus.com. The inclusion of our website address in this report does not include or incorporate by reference into this report any information on our website. You can obtain copies of our Forms 10-K, 10-Q, 8-K, and other filings with the SEC, and all amendments to these filings, free of charge, from our website as soon as reasonably practicable following our filing of any of these reports with the SEC. In addition, you may read and copy any material we file with the SEC at the SEC's Public Reference Room at 100 F Street NE, Room 1580, Washington, D.C. 20549. You may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC also maintains a website that contains reports, proxy, and information statements, and other information regarding registrants that file electronically with the SEC at www.sec.gov.

Information concerning our revenue, results of operations and revenue by geographic area is set forth in Item 6, "Selected Financial Data," in Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," and in Note 6, "Segments and Major Customers," of Notes to Consolidated Financial Statements of this Form 10-K, all of which are incorporated herein by reference. Information concerning identifiable assets and segment reporting is also set forth in Note 6, "Segments and Major Customers," of Notes to Consolidated Financial Statements of this Form 10-K. Information on customers that comprise 10% or more of our consolidated revenue and risks attendant to our foreign operations is set forth below in Item 1A, "Risk Factors."

Our Named Executive Officers

Information regarding our named executive officers and their ages and positions as of February 22, 2019, is contained in the table below. Our named executive officers are appointed by, and serve at the discretion of, our Board of Directors. There is no family relationship between any of our named executive officers.

| Name | Age | Position and Business Experience |
|---|---|---|
| Luc Seraphin | 55 | Mr. Seraphin is President & Chief Executive Officer. With over 20 years of experience managing global businesses, Mr. Seraphin brings the overall vision and leadership necessary to drive future growth for the company. Prior to this role, Mr. Seraphin was the senior vice president and general manager of the Memory and Interface Division, leading the development of the company's innovative memory architectures and high-speed serial link solutions. Mr. Seraphin also served as the senior vice president of Worldwide Sales and Operations where he oversaw sales, business development, customer support and operations across the various business units within Rambus.<br><br>Mr. Seraphin started his career as a field application engineer at NEC and later joined AT&T Bell Labs, which became Lucent Technologies and Agere Systems (now Avago Technologies). During his 18 years at Avago, Mr. Seraphin held several senior positions in sales, marketing and general management, culminating in his last position as executive vice president and general manager of the Wireless Business Unit. Following this, Mr. Seraphin held the position of general manager of a GPS startup company in Switzerland and was vice president of Worldwide Sales and Support at Sequans Communications. During his career, Mr. Seraphin has advised and supported companies in both the product and IP markets.<br><br>Mr. Seraphin holds a bachelor's degree in Mathematics and Physics and a master's degree in Electrical Engineering from Ecole Superieure de Chimie, Physique, Electronique, based in Lyon, France where he majored in Computer Architecture. Mr. Seraphin also holds an MBA from the University of Hartford and has completed the senior executive program of Columbia University. |
| Rahul Mathur | 45 | Senior Vice President, Finance and Chief Financial Officer. Mr. Mathur joined us in his current position in October 2016. Prior to joining us, Mr. Mathur served as senior vice president of finance at Cypress Semiconductor Corp., a provider of embedded memory, microcontroller, and analog semiconductor system solutions, from March 2015 to September 2016, where he was responsible for financial planning and investor relations. From August 2012 to March 2015, Mr. Mathur served as vice president of finance at Spansion, Inc. (later acquired by Cypress Semiconductor Corp.). Mr. Mathur served as vice president of finance at Picaboo Corporation from January 2012 to August 2012 and vice president of finance at CDNetworks Inc. from January 2011 to December 2011. Prior to January 2011, Mr. Mathur held senior finance positions at Telesis Technologies, Inc., NetSuite Inc. and KLA-Tencor Corporation. Mr. Mathur holds a Bachelor of Arts in applied mathematics from Dartmouth College and an M.B.A. from the Wharton School of Business at the University of Pennsylvania. |
| Jae Kim | 48 | Senior Vice President, General Counsel and Secretary. Mr. Kim has served as the senior vice president, general counsel and secretary since February 2013 and as our vice president, corporate legal since July 2010. Prior to his tenure at Rambus, Mr. Kim held senior legal positions at Aricent Inc., a privately-held communications technology company and Electronics for Imaging Inc., a digital printing technology company. Mr. Kim has also had significant experience in private practice with the law firm of Wilson Sonsini Goodrich & Rosati, P.C., where he advised high technology and emerging growth companies on mergers and acquisitions, private financings, public offerings, securities |

compliance, public company reporting and corporate governance. Mr. Kim began his legal career as an attorney with the United States Securities and Exchange Commission, Division of Corporation Finance, in Washington, D.C. Mr. Kim is a member of both the California State Bar and New York State Bar, and received a J.D. from the American University, Washington College of Law, and his bachelor’s degree from Boston University.

## Item 1A. Risk Factors

## RISK FACTORS

Because of the following factors, as well as other variables affecting our operating results, past financial performance may not be a reliable indicator of future performance, and historical trends should not be used to anticipate results or trends in future periods. See also “Note Regarding Forward-Looking Statements” at the beginning of this report.

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Risks Associated With Our Business, Industry and Market Conditions

The success of our business depends on sustaining or growing our licensing revenue and the failure to achieve such revenue would lead to a material decline in our results of operations.

Our revenue consists mainly of patent and technology license fees paid for access to our patents, developed technology and development and support services provided to our customers. Our ability to secure and renew the licenses from which our revenues are derived depends on our customers adopting our technology and using it in the products they sell. Once secured, license revenue may be negatively affected by factors within and outside our control, including reductions in our customers' sales prices, sales volumes, our failure to timely complete engineering deliverables, and the terms of such licenses. In addition, our licensing cycle for new licensees as well as renewals for existing licensees is lengthy, costly and unpredictable. We cannot provide any assurance that we will be successful in signing new license agreements or renewing existing license agreements on equal or favorable terms or at all. If we do not achieve our revenue goals, our results of operations could decline.

We have traditionally operated in, and may enter other, industries that are highly cyclical and competitive.

Our target customers are companies that develop and market high volume business and consumer products in semiconductors, computing, data centers, networks, tablets, handheld devices, mobile applications, gaming and graphics, high-definition televisions, cryptography and data security. The electronics industry is intensely competitive and has been impacted by rapid technological change, short product life cycles, cyclical market patterns, price erosion and increasing foreign and domestic competition. We are subject to many risks beyond our control that influence whether or not we are successful in winning target customers or retaining existing customers, including, primarily, competition in a particular industry, market acceptance of such customers' products and the financial resources of such customers. In particular, DRAM manufacturers, which make up a significant part of our revenue, are prone to significant business cycles and have suffered material losses and other adverse effects to their businesses, leading to industry consolidation from time-to-time that may result in loss of revenues under our existing license agreements or loss of target customers. As a result of ongoing competition in the industries in which we operate and volatility in various economies around the world, we may achieve a reduced number of licenses or may experience tightening of customers' operating budgets, difficulty or inability of our customers to pay our licensing fees, lengthening of the approval process for new licenses and consolidation among our customers. All of these factors may adversely affect the demand for our technology and may cause us to experience substantial fluctuations in our operating results.

We face competition from semiconductor and digital electronics products and systems companies, and other semiconductor intellectual property companies that provide security cores that are available to the market. We believe the principal competition for our technologies may come from our prospective customers, some of which are evaluating and developing products based on technologies that they contend or may contend will not require a license from us. Some of our competitors use a system-level design approach similar to ours, including activities such as board and package design, power and signal integrity analysis, and thermal management. Many of these companies are larger and may have better access to financial, technical and other resources than we possess.

To the extent that alternatives might provide comparable system performance at lower or similar cost to our technologies, or are perceived to require the payment of no or lower royalties, or to the extent other factors influence the industry, our customers and prospective customers may adopt and promote alternative technologies. Even to the extent we determine that such alternative technologies infringe our patents, there can be no assurance that we would be able to negotiate agreements that would result in royalties being paid to us without litigation, which could be costly and the results of which would be uncertain.

In addition, our expansion into new markets subjects us to additional risks. We may have limited or no experience in new products and markets, and our customers may not adopt our new offerings. These and other new offerings may present new and difficult challenges, which could negatively affect our operating results.

We may have to invest more resources in research and development than anticipated, which could increase our operating expenses and negatively impact our operating results.

If new competitors, technological advances by existing competitors, and/or development of new technologies or other competitive factors require us to invest significantly greater resources than anticipated in our research and development efforts, our operating expenses could increase. If we are required to invest significantly greater resources than anticipated in research and development efforts without an increase in revenue, our operating results would decline. We expect these expenses to increase in the foreseeable future as our technology development efforts continue.

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Our revenue is concentrated in a few customers, and if we lose any of these customers through contract terminations or acquisitions, our revenue may decrease substantially.

We have a high degree of revenue concentration. Our top five customers for each reporting period represented approximately 49%, 55% and 63% of our revenue for the years ended December 31, 2018, 2017 and 2016, respectively. For 2018, revenue from Broadcom and NVIDIA each accounted for 10% or more of our total revenue. For 2017 and 2016, revenue from Micron, Samsung and SK hynix each accounted for 10% or more of our total revenue. We expect to continue to experience significant revenue concentration for the foreseeable future.

In addition, our license agreements are complex and some contain terms that require us to provide certain customers with the lowest royalty rate that we provide to other customers for similar technologies, volumes and schedules. These clauses may limit our ability to effectively price differently among our customers, to respond quickly to market forces, or otherwise to compete on the basis of price. These clauses may also require us to reduce royalties payable by existing customers when we enter into or amend agreements with other customers. Any adjustment that reduces royalties from current customers or licensees may have a material adverse effect on our operating results and financial condition.

We continue to negotiate with customers and prospective customers to enter into license agreements. Any future agreement may trigger our obligation to offer comparable terms or modifications to agreements with our existing customers, which may be less favorable to us than the existing license terms. We expect licensing fees will continue to vary based on our success in renewing existing license agreements and adding new customers, as well as the level of variation in our customers' reported shipment volumes, sales price and mix, offset in part by the proportion of customer payments that are fixed. In particular, under our license agreement with Samsung, the license fees payable by Samsung are subject to certain adjustments and conditions, and we therefore cannot provide assurances that the revenues generated by this license will not decline in the future. In addition, some of our material license agreements may contain rights by the customer to terminate for convenience, or upon certain other events, such as change of control, material breach, insolvency or bankruptcy proceedings. If we are unsuccessful in entering into license agreements with new customers or renewing license agreements with existing customers, on favorable terms or at all, or if they are terminated, our results of operations may decline significantly.

Our business and operations could suffer in the event of security breaches.

Attempts by others to gain unauthorized access to our information technology systems are becoming more sophisticated. These attempts, which might be related to industrial or other espionage, include covertly introducing malware to our computers and networks and impersonating authorized users, among others. We seek to detect and investigate all security incidents and to prevent their recurrence, but in some cases, we might be unaware of an incident or its magnitude and effects. While we have not identified any material incidents of unauthorized access to date, the theft, unauthorized use or publication of our intellectual property and/or confidential business information could harm our competitive position and reputation, reduce the value of our investment in research and development and other strategic initiatives or otherwise adversely affect our business. To the extent that any future security breach results in inappropriate disclosure of our customers' confidential information, we may incur liability.

Failures in our products and services or in the products of our customers, including those resulting from security vulnerabilities, defects, bugs or errors, could harm our business.

Our products and services are highly technical and complex, and among our various businesses our products and services are crucial to providing security, payment and other critical functions for our customers’ operations. Our products and services have from time to time contained and may in the future contain undetected errors, bugs defects or other security vulnerabilities. Some errors in our products and services may only be discovered after a product or service has been deployed and used by customers, and may in some cases only be detected under certain circumstances or after extended use. In addition, because the techniques used by hackers to access or sabotage our products and services and other technologies change and evolve frequently and generally are not recognized until launched against a target, we may be unable to anticipate, detect or prevent these techniques and may not address them in our data security technologies. Any errors, bugs, defects or security vulnerabilities discovered in our solutions after commercial release could adversely affect our revenue, our customer relationships and the market's perception of our products and services. We may not be able to correct any errors, bugs, defects, security flaws or vulnerabilities promptly, or at all. Any breaches, defects, errors or vulnerabilities in our products and services could result in:

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- expenditure of significant financial and research and development resources in efforts to analyze, correct, eliminate or work around breaches, errors, bugs or defects or to address and eliminate vulnerabilities;
- financial liability to customers for breach of certain contract provisions, including indemnification obligations;
- loss of existing or potential customers;
- delayed or lost revenue;
- delay or failure to attain market acceptance;
- negative publicity, which would harm our reputation; and
- litigation, regulatory inquiries or investigations that would be costly and harm our reputation.

Some of our revenue is subject to the pricing policies of our customers over which we have no control.

We have no control over our customers' pricing of their products and there can be no assurance that licensed products will be competitively priced or will sell in significant volumes. Any premium charged by our customers in the price of memory and controller chips or other products over alternatives must be reasonable. If the benefits of our technology do not match the price premium charged by our customers, the resulting decline in sales of products incorporating our technology could harm our operating results.

Our licensing cycle is lengthy and costly, and our marketing and licensing efforts may be unsuccessful.

The process of persuading customers to adopt and license our chip interface, lighting, data security, and other technologies can be lengthy. Even if successful, there can be no assurance that our technologies will be used in a product that is ultimately brought to market, achieves commercial acceptance or results in significant royalties to us. We generally incur significant marketing and sales expenses prior to entering into our license agreements, generating a license fee and establishing a royalty stream from each customer. The length of time it takes to establish a new licensing relationship can take many months or even years. We may incur costs in any particular period before any associated revenue stream begins, if at all. If our marketing and sales efforts are very lengthy or unsuccessful, then we may face a material adverse effect on our business and results of operations as a result of failure to obtain or an undue delay in obtaining royalties.

Future revenue is difficult to predict for several reasons, and our failure to predict revenue accurately may result in our stock price declining.

Our lengthy license negotiation cycles could make our future revenue difficult to predict because we may not be successful in entering into or renewing licenses with our customers on our anticipated timelines.

In addition, while some of our license agreements provide for fixed, quarterly royalty payments, many of our license agreements provide for volume-based royalties, and may also be subject to caps on royalties in a given period. The sales volume and prices of our customers' products in any given period can be difficult to predict. In addition, we began applying the new revenue recognition standard (ASC 606) during the first quarter of 2018, as required, and we anticipate that our revenue will vary greatly from quarter to quarter. As a result of the foregoing items, our actual results may differ substantially from analyst estimates or our forecasts in any given quarter.

Also, a portion of our revenue comes from development and support services provided to our customers. Depending upon the nature of the services, a portion of the related revenue may be recognized ratably over the support period, or may be recognized according to contract revenue accounting. Contract revenue accounting may result in deferral of the service fees to the completion of the contract, or may result in the recognition of service fees over the period in which services are performed on a percentage-of-completion basis.

In addition, once we commercially launch our products, the sales volume of and resulting revenue from such products in any given period will be difficult to predict.

We may fail to meet our publicly announced guidance or other expectations about our business, which would likely cause our stock price to decline.

We provide guidance regarding our expected financial and business performance including our anticipated future revenues, operating expenses and other financial and operation metrics. We enhanced our guidance following implementation of Accounting Standards Update (ASU) No. 2014-09, Revenue from Contracts with Customers in Accounting Standards Codification (ASC) Topic 606 (“ASC 606”, “the New Revenue Standard”) in the first quarter of 2018.

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Correctly identifying the key factors affecting business conditions and predicting future events is an inherently uncertain process. Any guidance that we provide may not always be accurate, or may vary from actual results, due to our inability to correctly identify and quantify risks and uncertainties to our business and to quantify their impact on our financial performance. We offer no assurance that such guidance will ultimately be accurate, and investors should treat any such guidance with appropriate caution. If we fail to meet our guidance or if we find it necessary to revise such guidance, even if such failure or revision is seemingly insignificant, investors and analysts may lose confidence in us and the market value of our common stock could be materially adversely affected.

Changes in accounting principles and guidance could result in unfavorable accounting charges or effects.

We prepare our financial statements in accordance with accounting principles generally accepted in the United States and these principles are subject to interpretation by the SEC and various bodies. A change in these principles or application guidance, or in their interpretations, may have a material effect on our reported results, as well as our processes and related controls, and may retroactively affect previously reported results. For example, the New Revenue Standard, as amended, is effective for us on January 1, 2018. We adopted the New Revenue Standard on a modified retrospective basis, with a cumulative-effect adjustment to the opening balance of accumulated deficit on January 1, 2018. The New Revenue Standard materially impacted the timing of revenue recognition for our fixed-fee intellectual property (IP) licensing arrangements (including certain fixed-fee agreements that license our existing IP portfolio as well as IP added to our portfolio during the license term) as a majority of such revenue would be recognized at inception of the license term, as opposed to over time as is the case under prior U.S. GAAP, and we are required to compute and recognize interest income over time for certain licensing arrangements as control over the IP generally transfers significantly in advance of cash being received from customers. The impact of the adoption of the New Revenue Standard did not have a material impact on our other revenue streams. We have also enhanced the form and content of some of our guidance metrics that we provide following implementation of the New Revenue Standard. We expect that any change to current revenue recognition practices may significantly increase volatility in our quarterly revenue, financial results and trends, and may impact our stock price.

We have in the past made and may in the future make acquisitions or enter into mergers, strategic investments, sales of assets or other arrangements that may not produce expected operating and financial results.

From time to time, we engage in acquisitions, strategic transactions, strategic investments and potential discussions with respect thereto. Many of our acquisitions or strategic investments entail a high degree of risk, including those involving new areas of technology and such investments may not become liquid for several years after the date of the investment, if at all. Our acquisitions or strategic investments may not provide the advantages that we anticipated or generate the financial returns we expect, including if we are unable to close any pending acquisitions. For example, for any pending or completed acquisitions, we may discover unidentified issues not discovered in due diligence, and we may be subject to liabilities that are not covered by indemnification protection or become subject to litigation. Achieving the anticipated benefits of business acquisitions depends in part upon our ability to integrate the acquired businesses in an efficient and effective manner. The integration of companies that have previously operated independently may result in significant challenges, including, among others: retaining key employees; successfully integrating new employees, business systems and technology; retaining customers of the acquired business; minimizing the diversion of management's and other employees' attention from ongoing business matters; coordinating geographically separate organizations; consolidating research and development operations; and consolidating corporate and administrative infrastructures.

Our strategic investments in new areas of technology may involve significant risks and uncertainties, including distraction of management from current operations, greater than expected liabilities and expenses, inadequate return of capital, and unidentified issues not discovered in due diligence. These investments are inherently risky and may not be successful.

In addition, we may record impairment charges related to our acquisitions or strategic investments. Any losses or impairment charges that we incur related to acquisitions, strategic investments or sales of assets will have a negative impact on our financial results and the market value of our common stock, and we may continue to incur new or additional losses related to acquisitions or strategic investments.

We may have to incur debt or issue equity securities to pay for any future acquisition, which debt could involve restrictive covenants or which equity security issuance could be dilutive to our existing stockholders.

From time to time, we may also divest certain assets. These divestitures or proposed divestitures may involve the loss of revenue and/or potential customers, and the market for the associated assets may dictate that we sell such assets for less than what we paid. In addition, in connection with any asset sales or divestitures, we may be required to provide certain

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representations, warranties and covenants to buyers. While we would seek to ensure the accuracy of such representations and warranties and fulfillment of any ongoing obligations, we may not be completely successful and consequently may be subject to claims by a purchaser of such assets.

A substantial portion of our revenue is derived from sources outside of the United States and this revenue and our business generally are subject to risks related to international operations that are often beyond our control.

For the years ended December 31, 2018, 2017 and 2016, revenues received from our international customers constituted approximately 44%, 58% and 64%, respectively, of our total revenue. We expect that future revenue derived from international sources will continue to represent a significant portion of our total revenue.

To the extent that customer sales are not denominated in U.S. dollars, any royalties which are based on a percentage of the customers' sales that we receive as a result of such sales could be subject to fluctuations in currency exchange rates. In addition, if the effective price of licensed products sold by our foreign customers were to increase as a result of fluctuations in the exchange rate of the relevant currencies, demand for licensed products could fall, which in turn would reduce our royalties. We do not use financial instruments to hedge foreign exchange rate risk.

We currently have international business operations in the United Kingdom and the Netherlands, international design operations in Canada, India, Finland and France, and business development operations in Australia, China, Japan, Korea, Singapore and Taiwan. Our international operations and revenue are subject to a variety of risks which are beyond our control, including:

- hiring, maintaining and managing a workforce and facilities remotely and under various legal systems, including compliance with local labor and employment laws;
- non-compliance with our code of conduct or other corporate policies;
- natural disasters, acts of war, terrorism, widespread illness or security breaches;
- export controls, tariffs, import and licensing restrictions and other trade barriers;
- profits, if any, earned abroad being subject to local tax laws and not being repatriated to the United States or, if repatriation is possible, limited in amount;
- adverse tax treatment of revenue from international sources and changes to tax codes, including being subject to foreign tax laws and being liable for paying withholding, income or other taxes in foreign jurisdictions;
- unanticipated changes in foreign government laws and regulations;
- increased financial accounting and reporting burdens and complexities;
- lack of protection of our intellectual property and other contract rights by jurisdictions in which we may do business to the same extent as the laws of the United States;
- potential vulnerability to computer system, internet or other systemic attacks, such as denial of service, viruses or other malware which may be caused by criminals, terrorists or other sophisticated organizations;
- social, political and economic instability;
- geopolitical issues, including changes in diplomatic and trade relationships; and
- cultural differences in the conduct of business both with customers and in conducting business in our international facilities and international sales offices.

We and our customers are subject to many of the risks described above with respect to companies which are located in different countries. There can be no assurance that one or more of the risks associated with our international operations will not result in a material adverse effect on our business, financial condition or results of operations.

Weak global economic conditions may adversely affect demand for the products and services of our customers.

Our operations and performance depend significantly on worldwide economic conditions. Uncertainty about global or regional economic and political conditions poses a risk as consumers and businesses may postpone spending in response to tighter credit, negative financial news and declines in income or asset values, which could have a material negative effect on the demand for the products of our customers in the foreseeable future. If our customers experience reduced demand for their products as a result of global or regional economic conditions or otherwise, this could result in reduced royalty revenue and our business and results of operations could be harmed.

If our counterparties are unable to fulfill their financial and other obligations to us, our business and results of operations may be affected adversely.

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Any downturn in economic conditions or other business factors could threaten the financial health of our counterparties, including companies with which we have entered into licensing and/or settlement agreements, and their ability to fulfill their financial and other obligations to us. Such financial pressures on our counterparties may eventually lead to bankruptcy proceedings or other attempts to avoid financial obligations that are due to us. Because bankruptcy courts have the power to modify or cancel contracts of the petitioner which remain subject to future performance and alter or discharge payment obligations related to pre-petition debts, we may receive less than all of the payments that we would otherwise be entitled to receive from any such counterparty as a result of bankruptcy proceedings.

If we are unable to attract and retain qualified personnel, our business and operations could suffer.

Our success is dependent upon our ability to identify, attract, compensate, motivate and retain qualified personnel, especially engineers, senior management and other key personnel. The loss of the services of any key employees could be disruptive to our development efforts, business relationships and strategy, and could cause our business and operations to suffer.

Recently, we have experienced significant changes in our management team, including in the role of chief executive officer and other senior executives. Our future success depends in large part upon the continued service and enhancement of our management team and our employees. If there are further changes in management, such changes could be disruptive and could negatively affect our sales, operations, culture, future recruiting efforts and strategic direction. Competition for qualified executives is intense and if we are unable to compensate our key talent appropriately and continue expanding our management team, or successfully integrate new additions to our management team in a manner that enables us to scale our business and operations effectively, our ability to operate effectively and efficiently could be limited or negatively impacted. In addition, changes in key management positions may temporarily affect our financial performance and results of operations as new management becomes familiar with our business, processes and strategy. The loss of any of our key personnel, or our inability to attract, integrate and retain qualified employees, could require us to dedicate significant financial and other resources to such personnel matters, disrupt our operations and seriously harm our operations and business.

We are subject to various government restrictions and regulations, including on the sale of products and services that use encryption technology and those related to privacy and other consumer protection matters.

Various countries have adopted controls, license requirements and restrictions on the export, import and use of products or services that contain encryption technology. In addition, governmental agencies have proposed additional requirements for encryption technology, such as requiring the escrow and governmental recovery of private encryption keys. Restrictions on the sale or distribution of products or services containing encryption technology may impact our ability to license data security technologies to the manufacturers and providers of such products and services in certain markets or may require us or our customers to make changes to the licensed data security technology that is embedded in such products to comply with such restrictions. Government restrictions, or changes to the products or services our customers to comply with such restrictions, could delay or prevent the acceptance and use of such customers' products and services. In addition, the United States and other countries have imposed export controls that prohibit the export of encryption technology to certain countries, entities and individuals. Our failure to comply with export and use regulations concerning encryption technology could subject us to sanctions and penalties, including fines, and suspension or revocation of export or import privileges.

We are subject to a variety of laws and regulations in the United States, the European Union and other countries that involve, for example, user privacy, data protection and security, content and consumer protection. A number of proposals are pending before federal, state, and foreign legislative and regulatory bodies that could significantly affect our business. For example, in 2016, a new EU data protection regime, the General Data Protection Regulation

(“GDPR”) was adopted, with it fully effective on May 25, 2018. The GDPR may require us to modify our existing practices with respect to the collection, use, and disclosure of data. The GDPR provides for significant penalties in the case of non-compliance of up to €20 million or four percent of worldwide annual revenues, whichever is greater. The GDPR and other existing and proposed laws and regulations can be costly to comply with and can delay or impede the development of new products, result in negative publicity, increase our operating costs and subject us to claims or other remedies.

In accordance with the Dodd-Frank Wall Street Reform and Consumer Protection Act, the SEC established new disclosure and reporting requirements for those companies that use "conflict" minerals mined from the Democratic Republic of Congo and adjoining countries in their products, whether or not these products are manufactured by third parties. These requirements could affect the sourcing and availability of minerals that are used in the manufacture of our products. We have to date incurred costs and expect to incur significant additional costs associated with complying with the disclosure requirements, including for example, due diligence in regard to the sources of any conflict minerals used in our products, in addition to the cost of remediation and other changes to products, processes, or sources of supply as a consequence of such verification activities.

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Additionally, we may face reputational challenges with our customers and other stakeholders if we are unable to sufficiently verify the origins of all minerals used in our products through the due diligence procedures that we implement. We may also face challenges with government regulators and our customers and suppliers if we are unable to sufficiently verify that the metals used in our products are conflict free.

Our operations are subject to risks of natural disasters, acts of war, terrorism, widespread illness or security breach at our domestic and international locations, any one of which could result in a business stoppage and negatively affect our operating results.

Our business operations depend on our ability to maintain and protect our facilities, computer systems and personnel, which are primarily located in the San Francisco Bay Area in the United States, the United Kingdom, the Netherlands, India and Australia. The San Francisco Bay Area is in close proximity to known earthquake fault zones. Our facilities and transportation for our employees are susceptible to damage from earthquakes and other natural disasters such as fires, floods and similar events. Should a catastrophe disable our facilities, we do not have readily available alternative facilities from which we could conduct our business, so any resultant work stoppage could have a negative effect on our operating results. We also rely on our network infrastructure and technology systems for operational support and business activities which are subject to physical and cyber damage, and also susceptible to other related vulnerabilities common to networks and computer systems. Acts of terrorism, widespread illness, war and any event that causes failures or interruption in our network infrastructure and technology systems could have a negative effect at our international and domestic facilities and could harm our business, financial condition, and operating results.

We do not have extensive experience in manufacturing and marketing products and, as a result, may be unable to sustain and grow a profitable commercial market for new and existing products.

We do not have extensive experience in creating, manufacturing and marketing products, including our CryptoManager platform and new offerings that have resulted from our acquisition of SCS in the mobile credential and smart card solution spaces, and our acquisitions of the assets of the Snowbush IP group and the Memory Interconnect Business. These and other new offerings may present new and difficult challenges, and we may be subject to claims if customers of these offerings experience delays, failures, non-performance or other quality issues. In particular, we may experience difficulties with product design, qualification, manufacturing, marketing or certification that could delay or prevent our development, introduction or marketing of new products. Although we intend to design our products to be fully compliant with applicable industry standards, proprietary enhancements may not in the future result in full conformance with existing industry standards under all circumstances.

If we fail to introduce products that meet the demand of our customers or penetrate new markets in which we expend significant resources, our revenues will decrease over time and our financial condition could suffer. Additionally, if we concentrate resources on a new market that does not prove profitable or sustainable, it could damage our reputation and limit our growth, and our financial condition could decline.

We rely on a number of third-party providers for data center hosting facilities, equipment, maintenance and other services, and the loss of, or problems with, one or more of these providers may impede our growth or cause us to lose customers.

We rely on third-party providers to supply data center hosting facilities, equipment, maintenance and other services in order to provide some of our services, including in our offerings of our advanced mobile payment platform and smart ticketing platform, and have entered into various agreements for such services. The continuous availability of our service depends on the operations of those facilities, on a variety of network service providers and on third-party vendors. In addition, we depend on our third-party facility providers’ ability to protect these facilities against damage or interruption from natural disasters, power or telecommunications failures, criminal acts, cyber-attacks and similar events. If there are any lapses of service or damage to a facility, we could experience lengthy interruptions in our service as well as delays and additional expenses in arranging new facilities and services. Even with current and planned disaster recovery arrangements, our business could be harmed. Any interruptions or delays in our service, whether as a result of third-party error, our own error, natural disasters, criminal acts, security breaches or other causes, whether accidental or willful, could harm our relationships with customers, harm our reputation and cause our revenue to decrease and/or our expenses to increase. Also, in the event of damage or interruption, our insurance policies may not adequately compensate us for any losses that we may incur. These factors in turn could further reduce our revenue, subject us to liability and cause us to issue credits or cause us to lose customers, any of which could materially adversely affect our business.

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We rely on third parties for a variety of services, including manufacturing, and these third parties' failure to perform these services adequately could materially and adversely affect our business.

We rely on third parties for a variety of services, including our manufacturing supply chain partners and third parties within our sales and distribution channels. Certain of these third parties are, and may be, our sole manufacturer or sole source of production materials. If we fail to manage our relationship with these manufacturers and suppliers effectively, or if they experience delays, disruptions, capacity constraints or quality control problems in their operations, our ability to ship products to our customers could be impaired and our competitive position and reputation could be harmed. In addition, any adverse change in any of our manufacturers and suppliers' financial or business condition could disrupt our ability to supply quality products to our customers. If we are required to change our manufacturers, we may lose revenue, incur increased costs and damage our end-customer relationships. In addition, qualifying a new manufacturer and commencing production can be an expensive and lengthy process. If our third party manufacturers or suppliers are unable to provide us with adequate supplies of high-quality products for any other reason, we could experience a delay in our order fulfillment, and our business, operating results and financial condition would be adversely affected. In the event these and other third parties we rely on fail to provide their services adequately, including as a result of errors in their systems or events beyond their control, or refuse to provide these services on terms acceptable to us or at all, and we are not able to find suitable alternatives, our business may be materially and adversely affected. In addition, our orders may represent a relatively small percentage of the overall orders received by our manufacturers from their customers. As a result, fulfilling our orders may not be considered a priority in the event our manufacturers are constrained in their ability to fulfill all of their customer obligations in a timely manner. If our manufacturers are unable to provide us with adequate supplies of high-quality products, or if we or our manufacturers are unable to obtain adequate quantities of components, it could cause a delay in our order fulfillment, in which case our business, operating results and financial condition could be adversely affected.

Warranty, service level agreement and product liability claims brought against us could cause us to incur significant costs and adversely affect our operating results as well as our reputation and relationships with customers.

We may from time to time be subject to warranty, service level agreement and product liability claims with regard to product performance and our services. We could incur material losses as a result of warranty, support, repair or replacement costs in response to customer complaints or in connection with the resolution of contemplated or actual legal proceedings relating to such claims. In addition to potential losses arising from claims and related legal proceedings, warranty and product liability claims could affect our reputation and our relationship with customers. We generally attempt to limit the maximum amount of indemnification or liability that we could be exposed to under our contracts, however, this is not always possible.

Any failure in our delivery of high-quality technical support services may adversely affect our relationships with our customers and our financial results.

Our customers depend on our support organization to resolve technical issues and provide ongoing maintenance relating to our products and services. We may be unable to respond quickly enough to accommodate short-term increases in customer demand for support services. Increased customer demand for these services, without corresponding revenues, could increase costs and adversely affect our operating results. In addition, our sales process is highly dependent on our offerings and business reputation and on positive recommendations from our existing customers. Any failure to maintain high-quality technical support, or a market perception that we do not maintain high-quality support, could adversely affect our reputation, our ability to sell our solutions to existing and prospective customers, and our business, operating results and financial position.

Certain software that we use in certain of our products is licensed from third parties and, for that reason, may not be available to us in the future, which has the potential to delay product development and production or cause us to incur additional expense, which could materially adversely affect our business, financial condition, operating results and cash flow.

Some of our products and services contain software licensed from third parties. Some of these licenses may not be available to us in the future on terms that are acceptable to us or allow our products to remain competitive. The loss of these licenses or the inability to maintain any of them on commercially acceptable terms could delay development of future offerings or the enhancement of existing products and services. We may also choose to pay a premium price for such a license in certain circumstances where continuity of the licensed product would outweigh the premium cost of the license. The unavailability of these licenses or the necessity of agreeing to commercially unreasonable terms for such licenses could materially adversely affect our business, financial condition, operating results and cash flow.

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Certain software we use is from open source code sources, which, under certain circumstances, may lead to unintended consequences and, therefore, could materially adversely affect our business, financial condition, operating results and cash flow.

We use open source software in our services, including our advanced mobile payment platform and smart ticketing platform, and we intend to continue to use open source software in the future. From time to time, there have been claims challenging the ownership of open source software against companies that incorporate open source software into their products or alleging that these companies have violated the terms of an open source license. As a result, we could be subject to lawsuits by parties claiming ownership of what we believe to be open source software or alleging that we have violated the terms of an open source license. Litigation could be costly for us to defend, have a negative effect on our operating results and financial condition or require us to devote additional research and development resources to change our solutions. In addition, if we were to combine our proprietary software solutions with open source software in certain manners, we could, under certain open source licenses, be required to publicly release the source code of our proprietary software solutions. If we inappropriately use open source software, we may be required to re-engineer our solutions, discontinue the sale of our solutions, release the source code of our proprietary software to the public at no cost or take other remedial actions. There is a risk that open source licenses could be construed in a way that could impose unanticipated conditions or restrictions on our ability to commercialize our solutions, which could adversely affect our business, operating results and financial condition.

Our business and operating results could be harmed if we undertake any restructuring activities.

From time to time, we may undertake restructurings of our business, including discontinuing certain products, services and technologies and planned reductions in force. There are several factors that could cause restructurings to have adverse effects on our business, financial condition and results of operations. These include potential disruption of our operations, the development of our technology, the deliveries to our customers and other aspects of our business. Loss of sales, service and engineering talent, in particular, could damage our business. Any restructuring would require substantial management time and attention and may divert management from other important work. Employee reductions or other restructuring activities also would cause us to incur restructuring and related expenses such as severance expenses. Moreover, we could encounter delays in executing any restructuring plans, which could cause further disruption and additional unanticipated expense.

Problems with our information systems could interfere with our business and could adversely impact our operations.

We rely on our information systems and those of third parties for fulfilling licensing and contractual obligations, processing customer orders, delivering products, providing services and support to our customers, billing and tracking our customer orders, performing accounting operations and otherwise running our business. If our systems fail, our disaster and data recovery planning and capacity may prove insufficient to enable timely recovery of important functions and business records. Any disruption in our information systems and those of the third parties upon whom we rely could have a significant impact on our business. Additionally, our information systems may not support new business models and initiatives and significant investments could be required in order to upgrade them. For example, in connection with our adoption of the New Revenue Standard, we plan to augment our systems with new revenue accounting software, utilizing internal and third party resources. Delays in adapting our information systems to address new business models and accounting standards could limit the success or result in the failure of such initiatives and impair the effectiveness of our internal controls. Even if we do not encounter these adverse effects, the implementation of these enhancements may be much more costly than we anticipated. If we are unable to successfully implement the information systems enhancements as planned, our operating results could be negatively impacted.

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Risks Related to Capitalization Matters and Corporate Governance

The price of our common stock may continue to fluctuate.

Our common stock is listed on The NASDAQ Global Select Market under the symbol "RMBS." The trading price of our common stock has at times experienced price volatility and may continue to fluctuate significantly in response to various factors, some of which are beyond our control. Some of these factors include:

- any progress, or lack of progress, real or perceived, in the development of products that incorporate our innovations and technology companies' acceptance of our products, including the results of our efforts to expand into new target markets;
- our signing or not signing new licenses and the loss of strategic relationships with any customer;
- announcements of technological innovations or new products by us, our customers or our competitors;
- changes in our strategies, including changes in our licensing focus and/or acquisitions or dispositions of companies or businesses with business models or target markets different from our core;
- positive or negative reports by securities analysts as to our expected financial results and business developments;
- developments with respect to patents or proprietary rights and other events or factors;
- new litigation and the unpredictability of litigation results or settlements;
- repurchases of our common stock on the open market;
- issuance of additional securities by us, including in acquisitions; and
- changes in accounting pronouncements, including implementation of the New Revenue Standard.

In addition, the stock market in general, and prices for companies in our industry in particular, have experienced extreme volatility that often has been unrelated to the operating performance of such companies. These broad market and industry fluctuations may adversely affect the price of our common stock, regardless of our operating performance.

We have outstanding senior convertible notes in an aggregate principal amount totaling $172.5 million. Because these notes are convertible into shares of our common stock, volatility or depressed prices of our common stock could have a similar effect on the trading price of such notes. In addition, the existence of these notes may encourage short selling in our common stock by market participants because the conversion of the notes could depress the price of our common stock.

We have been party to, and may in the future be subject to, lawsuits relating to securities law matters which may result in unfavorable outcomes and significant judgments, settlements and legal expenses which could cause our business, financial condition and results of operations to suffer.

We and certain of our current and former officers and directors, as well as our current auditors, were subject from 2006 to 2011 to several stockholder derivative actions, securities fraud class actions and/or individual lawsuits filed in federal court against us and certain of our current and former officers and directors. The complaints generally alleged that the defendants violated the federal and state securities laws and stated state law claims for fraud and breach of fiduciary duty. Although to date these complaints have either been settled or dismissed, the amount of time to resolve any future lawsuits is uncertain, and these matters could require significant management and financial resources. Unfavorable outcomes and significant judgments, settlements and legal expenses in litigation related to any future securities law claims could have material adverse impacts on our business, financial condition, results of operations, cash flows and the trading price of our common stock.

We are leveraged financially, which could adversely affect our ability to adjust our business to respond to competitive pressures and to obtain sufficient funds to satisfy our future research and development needs, to protect and enforce our intellectual property, and to meet other needs.

We have material indebtedness. In November 2017, we issued $172.5 million aggregate principal amount of our 2023 Notes, the entire amount of which remains outstanding. The degree to which we are leveraged could have negative consequences, including, but not limited to, the following:

- we may be more vulnerable to economic downturns, less able to withstand competitive pressures and less flexible in responding to changing business and economic conditions;
-

our ability to obtain additional financing in the future for working capital, capital expenditures, acquisitions, litigation, general corporate or other purposes may be limited;

- a substantial portion of our cash flows from operations in the future may be required for the payment of interest and principal when due at maturity in February 2023; and
- we may be required to make cash payments upon any conversion of the 2023 Notes, which would reduce our cash on hand.

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A failure to comply with the covenants and other provisions of our debt instruments could result in events of default under such instruments, which could permit acceleration of all of our outstanding 2023 Notes. Any required repurchase of the 2023 Notes as a result of a fundamental change or acceleration of the 2023 Notes would reduce our cash on hand such that we would not have those funds available for use in our business.

If we are at any time unable to generate sufficient cash flows from operations to service our indebtedness when payment is due, we may be required to attempt to renegotiate the terms of the instruments relating to the indebtedness, seek to refinance all or a portion of the indebtedness or obtain additional financing. There can be no assurance that we will be able to successfully renegotiate such terms, that any such refinancing would be possible or that any additional financing could be obtained on terms that are favorable or acceptable to us.

Compliance with changing regulation of corporate governance and public disclosure may result in additional expenses.

Changing laws, regulations and standards relating to corporate governance and public disclosure have historically created uncertainty for companies such as ours. Any new or changed laws, regulations and standards are subject to varying interpretations due to their lack of specificity, and as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices.

Our certificate of incorporation and bylaws, Delaware law, our outstanding convertible notes and certain other agreements contain provisions that could discourage transactions resulting in a change in control, which may negatively affect the market price of our common stock.

Our certificate of incorporation, our bylaws and Delaware law contain provisions that might enable our management to discourage, delay or prevent a change in control. In addition, these provisions could limit the price that investors would be willing to pay in the future for shares of our common stock. Pursuant to such provisions:

- our board of directors is authorized, without prior stockholder approval, to create and issue preferred stock, commonly referred to as “blank check” preferred stock, with rights senior to those of common stock, which means that a stockholder rights plan could be implemented by our board;
- our board of directors is staggered into two classes, only one of which is elected at each annual meeting;
- stockholder action by written consent is prohibited;
- nominations for election to our board of directors and the submission of matters to be acted upon by stockholders at a meeting are subject to advance notice requirements;
- certain provisions in our bylaws and certificate of incorporation such as notice to stockholders, the ability to call a stockholder meeting, advance notice requirements and action of stockholders by written consent may only be amended with the approval of stockholders holding 66 2/3% of our outstanding voting stock;
- our stockholders have no authority to call special meetings of stockholders; and
- our board of directors is expressly authorized to make, alter or repeal our bylaws.

We are also subject to Section 203 of the Delaware General Corporation Law, which provides, subject to enumerated exceptions, that if a person acquires 15% or more of our outstanding voting stock, the person is an “interested stockholder” and may not engage in any “business combination” with us for a period of three years from the time the person acquired 15% or more of our outstanding voting stock.

Certain provisions of our outstanding Notes could make it more difficult or more expensive for a third party to acquire us. Upon the occurrence of certain transactions constituting a fundamental change, holders of such Notes will have the right, at their option, to require us to repurchase, at a cash repurchase price equal to 100% of the principal amount plus accrued and unpaid interest on such Notes, all or a portion of their Notes. We may also be required to increase the conversion rate of such Notes in the event of certain fundamental changes.

Unanticipated changes in our tax rates or in the tax laws and regulations could expose us to additional income tax liabilities which could affect our operating results and financial condition.

We are subject to income taxes in both the United States and various foreign jurisdictions. Significant judgment is required in determining our worldwide provision for income taxes and, in the ordinary course of business, there are many transactions and calculations where the ultimate tax determination is uncertain. Our effective tax rate could be adversely affected by changes in the mix of earnings in countries with differing statutory tax rates, changes in the valuation of deferred tax assets and liabilities, changes in tax laws and regulations as well as other factors. Our tax determinations are regularly subject to audit by tax authorities and developments in those audits could adversely affect our income tax provision, and we are currently undergoing such audits of certain of our tax returns. Although we believe that our tax estimates are reasonable, the final

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determination of tax audits or tax disputes may be different from what is reflected in our historical income tax provisions which could affect our operating results.

Litigation, Regulation and Business Risks Related to our Intellectual Property

Adverse litigation results could affect our business.

We may be subject to legal claims or regulatory matters involving consumer, stockholder, employment, competition, intellectual property and other issues on a global basis. Litigation can be lengthy, expensive and disruptive to our operations, and results cannot be predicted with certainty. An adverse decision could include monetary damages or, in cases for which injunctive relief is sought, an injunction prohibiting us from manufacturing or selling one or more of our products or technologies. If we were to receive an unfavorable ruling on a matter, our business, operating results or financial condition could be materially harmed.

We have in the past, and may in the future, become engaged in litigation stemming from our efforts to protect and enforce our patents and intellectual property and make other claims, which could adversely affect our intellectual property rights, distract our management and cause substantial expenses and declines in our revenue and stock price.

We seek to diligently protect our intellectual property rights and will continue to do so. While we are not currently involved in intellectual property litigation, any future litigation, whether or not determined in our favor or settled by us, would be expected to be costly, may cause delays applicable to our business (including delays in negotiating licenses with other actual or potential customers), would be expected to discourage future design partners, would tend to impair adoption of our existing technologies and would divert the efforts and attention of our management and technical personnel from other business operations. In addition, we may be unsuccessful in any litigation if we have difficulty obtaining the cooperation of former employees and agents who were involved in our business during the relevant periods related to our litigation and are now needed to assist in cases or testify on our behalf. Furthermore, any adverse determination or other resolution in litigation could result in our losing certain rights beyond the rights at issue in a particular case, including, among other things: our being effectively barred from suing others for violating certain or all of our intellectual property rights; our patents being held invalid or unenforceable or not infringed; our being subjected to significant liabilities; our being required to seek licenses from third parties; our being prevented from licensing our patented technology; or our being required to renegotiate with current customers on a temporary or permanent basis.

From time to time, we are subject to proceedings by government agencies that may result in adverse determinations against us and could cause our revenue to decline substantially.

An adverse resolution by or with a governmental agency could result in severe limitations on our ability to protect and license our intellectual property, and could cause our revenue to decline substantially. Third parties have and may attempt to use adverse findings by a government agency to limit our ability to enforce or license our patents in private litigations, to challenge or otherwise act against us with respect to such government agency proceedings.

Further, third parties have sought and may seek review and reconsideration of the patentability of inventions claimed in certain of our patents by the U.S. Patent and Trademark Office (“USPTO”) and/or the European Patent Office (the “EPO”). Any re-examination proceedings may be reviewed by the USPTO's Patent Trial and Appeal Board (“PTAB”). The PTAB and the related former Board of Patent Appeals and Interferences have previously issued decisions in a few cases, finding some challenged claims of Rambus' patents to be valid, and others to be invalid. Decisions of the PTAB are subject to further USPTO proceedings and/or appeal to the Court of Appeals for the Federal Circuit. A final adverse decision, not subject to further review and/or appeal, could invalidate some or all of the challenged patent claims and could also result in additional adverse consequences affecting other related U.S. or European patents, including in any intellectual property litigation. If a sufficient number of such patents are impaired, our ability to enforce or license our intellectual property would be significantly weakened and could cause our revenue to decline substantially.

The pendency of any governmental agency acting as described above may impair our ability to enforce or license our patents or collect royalties from existing or potential customers, as any litigation opponents may attempt to use such proceedings to delay or otherwise impair any pending cases and our existing or potential customers may await the final outcome of any proceedings before agreeing to new licenses or to paying royalties.

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Litigation or other third-party claims of intellectual property infringement could require us to expend substantial resources and could prevent us from developing or licensing our technology on a cost-effective basis.

Our research and development programs are in highly competitive fields in which numerous third parties have issued patents and patent applications with claims closely related to the subject matter of our programs. We have also been named in the past, and may in the future be named, as a defendant in lawsuits claiming that our technology infringes upon the intellectual property rights of third parties. As we develop additional products and technology, we may face claims of infringement of various patents and other intellectual property rights by third parties. In the event of a third-party claim or a successful infringement action against us, we may be required to pay substantial damages, to stop developing and licensing our infringing technology, to develop non-infringing technology, and to obtain licenses, which could result in our paying substantial royalties or our granting of cross licenses to our technologies. We may not be able to obtain licenses from other parties at a reasonable cost, or at all, which could cause us to expend substantial resources, or result in delays in, or the cancellation of, new products. Moreover, customers and/or suppliers of our products may seek indemnification for alleged infringement of intellectual property rights.  We could be liable for direct and consequential damages and expenses including attorneys' fees. A future obligation to indemnify our customers and/or suppliers may harm our business, financial condition and operating results.

If we are unable to protect our inventions successfully through the issuance and enforcement of patents, our operating results could be adversely affected.

We have an active program to protect our proprietary inventions through the filing of patents. There can be no assurance, however, that:

- any current or future U.S. or foreign patent applications will be approved and not be challenged by third parties;
- our issued patents will protect our intellectual property and not be challenged by third parties;
- the validity of our patents will be upheld;
- our patents will not be declared unenforceable;
- the patents of others will not have an adverse effect on our ability to do business;
- Congress or the U.S. courts or foreign countries will not change the nature or scope of rights afforded patents or patent owners or alter in an adverse way the process for seeking or enforcing patents;
- changes in law will not be implemented, or changes in interpretation of such laws will occur, that will affect our ability to protect and enforce our patents and other intellectual property;
- new legal theories and strategies utilized by our competitors will not be successful;
- others will not independently develop similar or competing chip interfaces or design around any patents that may be issued to us; or
- factors such as difficulty in obtaining cooperation from inventors, pre-existing challenges or litigation, or license or other contract issues will not present additional challenges in securing protection with respect to patents and other intellectual property that we acquire.

If any of the above were to occur, our operating results could be adversely affected.

Furthermore, recent patent reform legislation, such as the Leahy-Smith America Invents Act, could increase the uncertainties and costs surrounding the prosecution of any patent applications and the enforcement or defense of our licensed patents. The federal courts, the USPTO, the Federal Trade Commission, and the U.S. International Trade Commission have also recently taken certain actions and issued rulings that have been viewed as unfavorable to patentees. While we cannot predict what form any new patent reform laws or regulations may ultimately take, or what impact recent or future reforms may have on our business, any laws or regulations that restrict or negatively impact our ability to enforce our patent rights against third parties could have a material adverse effect on our business.

In addition, our patents will continue to expire according to their terms, with expected expiration dates ranging from 2019 to 2037. Our failure to continuously develop or acquire successful innovations and obtain patents on those innovations could significantly harm our business, financial condition, results of operations, or cash flows.

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Our inability to protect and own the intellectual property we create would cause our business to suffer.

We rely primarily on a combination of license, development and nondisclosure agreements, trademark, trade secret and copyright law and contractual provisions to protect our non-patentable intellectual property rights. If we fail to protect these intellectual property rights, our customers and others may seek to use our technology without the payment of license fees and royalties, which could weaken our competitive position, reduce our operating results and increase the likelihood of costly litigation. The growth of our business depends in part on the use of our intellectual property in the products of third party manufacturers, and our ability to enforce intellectual property rights against them to obtain appropriate compensation. In addition, effective trade secret protection may be unavailable or limited in certain foreign countries. Although we intend to protect our rights vigorously, if we fail to do so, our business will suffer.

Effective protection of trademarks, copyrights, domain names, patent rights, and other intellectual property rights is expensive and difficult to maintain, both in terms of application and maintenance costs, as well as the costs of defending and enforcing those rights. The efforts we have taken to protect our intellectual property rights may not be sufficient or effective. Our intellectual property rights may be infringed, misappropriated, or challenged, which could result in them being narrowed in scope or declared invalid or unenforceable. In addition, the laws or practices of certain countries do not protect our proprietary rights to the same extent as do the laws of the United States. Significant impairments of our intellectual property rights, and limitations on our ability to assert our intellectual property rights against others, could have a material and adverse effect on our business.

Third parties may claim that our products or services infringe on their intellectual property rights, exposing us to litigation that, regardless of merit, may be costly to defend.

Our success and ability to compete are also dependent upon our ability to operate without infringing upon the patent, trademark and other intellectual property rights of others. Third parties may claim that our current or future products or services infringe upon their intellectual property rights. Any such claim, with or without merit, could be time consuming, divert management's attention from our business operations and result in significant expenses. We cannot assure you that we would be successful in defending against any such claims. In addition, parties making these claims may be able to obtain injunctive or other equitable relief affecting our ability to license the products that incorporate the challenged intellectual property. As a result of such claims, we may be required to obtain licenses from third parties, develop alternative technology or redesign our products. We cannot be sure that such licenses would be available on terms acceptable to us, if at all. If a successful claim is made against us and we are unable to develop or license alternative technology, our business, financial condition, operating results and cash flows could be materially adversely affected.

We rely upon the accuracy of our customers' recordkeeping, and any inaccuracies or payment disputes for amounts owed to us under our licensing agreements may harm our results of operations.

Many of our license agreements require our customers to document the manufacture and sale of products that incorporate our technology and report this data to us on a quarterly basis. While licenses with such terms give us the right to audit books and records of our customers to verify this information, audits rarely are undertaken because they can be expensive, time consuming, and potentially detrimental to our ongoing business relationship with our customers. Therefore, we typically rely on the accuracy of the reports from customers without independently verifying the information in them. Our failure to audit our customers' books and records may result in our receiving more or less royalty revenue than we are entitled to under the terms of our license agreements. If we conduct royalty audits in the future, such audits may trigger disagreements over contract terms with our customers and such disagreements could hamper customer relations, divert the efforts and attention of our management from normal operations and impact our business operations and financial condition.

Any dispute regarding our intellectual property may require us to indemnify certain customers, the cost of which could severely hamper our business operations and financial condition.

In any potential dispute involving our patents or other intellectual property, our customers could also become the target of litigation. While we generally do not indemnify our customers, some of our agreements provide for indemnification, and some require us to provide technical support and information to a customer that is involved in litigation involving use of our technology. In addition, we may be exposed to indemnification obligations, risks and liabilities that were unknown at the time of acquisitions, including with respect to our acquisitions of SCS, the assets of the Snowbush IP group and the Memory Interconnect Business, and we may agree to indemnify others in the future. Any of these indemnification and support obligations could result in substantial and material expenses. In addition to the time and expense required for us to indemnify or supply such support to our customers, a customer's development, marketing and sales of licensed semiconductors, lighting, mobile communications and data security technologies could be severely disrupted or shut down as a result of litigation, which in turn could severely hamper our business operations and financial condition as a result of lower or no royalty payments.

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Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

As of December 31, 2018, we occupied offices in the leased facilities described below:

| Number of Offices Under Lease | Location | Primary Use |
|---|---|---|
| 7 | United States | |
| | Sunnyvale, CA (Corporate Headquarters) | Executive and administrative offices, research and development, sales and marketing and service functions |
| | Chapel Hill, NC | Research and development |
| | Brecksville, OH (2 locations) | Research and development, prototyping and light manufacturing facility |
| | San Francisco, CA | Research and development |
| | Richardson, TX | Research and development |
| | Agoura Hills, CA | Research and development |
| 1 | Bangalore, India | Administrative offices, research and development and service functions |
| 1 | Tokyo, Japan | Business development |
| 1 | Seoul, Korea | Business development |
| 1 | Shanghai, China | Business development |
| 1 | Singapore | Business development |
| 1 | Taipei, Taiwan | Business development |
| 1 | Melbourne, Australia | Business development |
| 1 | Rotterdam, The Netherlands | Administrative offices, research and development, sales and marketing and service functions |
| 1 | East Kilbride, United Kingdom | Administrative offices, research and development, sales and marketing and service functions |
| 1 | Toronto, Canada | Research and development |
| 1 | Espoo, Finland | Research and development |

Item 3. Legal Proceedings

We are not currently a party to any material pending legal proceeding; however, from time to time, we may become involved in legal proceedings or be subject to claims arising in the ordinary course of our business. Although the results of litigation and claims cannot be predicted with certainty, we currently believe that the final outcome of these ordinary course matters will not have a material adverse effect on our business, operating results, financial position or cash flows. Regardless of the outcome, litigation can have an adverse impact on us because of defense and settlement costs, diversion of management attention and resources and other factors.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

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

Our Common Stock is listed on The NASDAQ Global Select Market under the symbol "RMBS." The following table sets forth for the periods indicated the high and low sales price per share of our common stock as reported on The NASDAQ Global Select Market.

| | Year Ended December 31, 2018 | | Year Ended December 31, 2017 | |
|---|---|---|---|---|
| | High | Low | High | Low |
| First Quarter | $14.63 | $11.85 | $14.24 | $12.37 |
| Second Quarter | $14.30 | $12.54 | $13.41 | $11.39 |
| Third Quarter | $13.61 | $10.76 | $13.64 | $11.30 |
| Fourth Quarter | $10.99 | $7.17 | $15.50 | $13.32 |

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The graph below compares the cumulative 5-year total return of holders of Rambus Inc.'s common stock with the cumulative total returns of the NASDAQ Composite index and the RDG Semiconductor Composite index. The graph tracks the performance of a $100 investment in our common stock and in each index (with the reinvestment of all dividends) from December 31, 2013 to December 31, 2018.

Fiscal years ending:

| | 12/13 | 12/14 | 12/15 | 12/16 | 12/17 | 12/18 |
|---|---|---|---|---|---|---|
| Rambus Inc. | 100.00 | 117.11 | 122.39 | 145.41 | 150.16 | 80.99 |
| NASDAQ Composite | 100.00 | 114.62 | 122.81 | 133.19 | 172.11 | 165.84 |
| RDG Semiconductor Composite | 100.00 | 128.26 | 118.01 | 157.41 | 216.98 | 197.02 |

The stock price performance included in this graph is not necessarily indicative of future stock price performance.

Information regarding our securities authorized for issuance under equity compensation plans will be included in Item 12, “Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters,” of this report on Form 10-K.

As of January 31, 2019, there were 463 holders of record of our common stock. Since many of the shares of our common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of beneficial stockholders represented by these record holders.

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

Share Repurchase Program

On January 21, 2015, our Board approved a share repurchase program authorizing the repurchase of up to an aggregate of 20.0 million shares. Share repurchases under the plan may be made through the open market, established plans or privately negotiated transactions in accordance with all applicable securities laws, rules, and regulations. There is no expiration date applicable to the plan. As part of the broader share repurchase program previously authorized by our Board on January 21, 2015, we initiated an accelerated share repurchase program with Citibank, N.A. on March 5, 2018 which was completed in the second quarter of 2018. After giving effect to such accelerated share repurchase program, detailed in the table below, we had remaining authorization to repurchase approximately 3.6 million shares.

We record stock repurchases as a reduction to stockholders' equity. We record a portion of the purchase price of the repurchased shares as an increase to accumulated deficit when the price of the shares repurchased exceeds the average original proceeds per share received from the issuance of common stock.

| Period | Total Number of Shares Purchased | Average Price Paid per Share | Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs | Maximum Number of Shares that May Yet be Purchased Under the Plans or Programs |
|---|---|---|---|---|
| Cumulative shares repurchased as of December 31, 2017 | 12,565,372 | $11.94 | 12,565,372 | 7,434,628 |
| January 1, 2018 - March 31, 2018 (1) | 3,117,693 | $13.21 | 3,117,693 | 4,316,935 |
| April 1, 2018 - June 30, 2018 (1) | 667,653 | $13.21 | 667,653 | 3,649,282 |
| Cumulative shares repurchased as of December 31, 2018 | 16,350,718 | | 16,350,718 | |

(1) In the first quarter of 2018, we entered into an accelerated share repurchase program with Citibank, N.A. to repurchase an aggregate of $50.0 million of our common stock. We made an upfront payment of $50.0 million pursuant to the accelerated share repurchase program and received an initial delivery of 3.1 million shares which were retired and recorded as a $40.0 million reduction to stockholders' equity. The remaining $10.0 million of the initial payment was recorded as a reduction to stockholders' equity as an unsettled forward contract indexed to our stock. During the second quarter of 2018, the accelerated share repurchase program was completed and we received an additional 0.7 million shares of our common stock, which were retired, as the final settlement of the accelerated share repurchase program. The total shares of our common stock received and retired under the terms of the accelerated share repurchase program were 3.8 million, with an average price paid per share of $13.21. See Note 13, "Stockholders' Equity," of Notes to Consolidated Financial Statements of this Form 10-K for further discussion.

Item 6. Selected Financial Data

The following selected consolidated financial data as of and for the years ended December 31, 2018, 2017, 2016, 2015 and 2014 was derived from our consolidated financial statements. The following selected consolidated financial data should be read in conjunction with Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations," and Item 8, "Financial Statements and Supplementary Data," and other financial data included elsewhere in this report. Our historical results of operations are not necessarily indicative of results of operations to be expected for any future period.

| | Years Ended December 31, | | | | |
|---|---|---|---|---|---|
| | 2018 (3) (4) (5) | 2017 (3) (4) | 2016 (1) (2) | 2015 (2) (3) (4) | 2014 (2) |
| | (In thousands, except per share amounts) | | | | |
| Total revenue | $231,201 | $393,096 | $336,597 | $296,278 | $296,558 |
| Net income (loss) | $(157,957) | $(22,862) | $6,820 | $211,388 | $26,201 |
| Net income (loss) per share: | | | | | |
| Basic | $(1.46) | $(0.21) | $0.06 | $1.84 | $0.23 |
| Diluted | $(1.46) | $(0.21) | $0.06 | $1.80 | $0.22 |
| Consolidated Balance Sheet Data: | | | | | |
| Cash, cash equivalents and marketable securities | $277,764 | $329,376 | $172,182 | $287,706 | $300,109 |
| Total assets | $1,361,155 | $891,072 | $783,496 | $718,021 | $586,235 |
| Convertible notes | $141,934 | $213,898 | $126,167 | $119,418 | $113,045 |
| Stockholders' equity | $1,012,112 | $571,584 | $552,782 | $526,533 | $391,622 |

(1) The net income for the year ended December 31, 2016 included $18.3 million of impairment of in-process research and development intangible asset and a reduction of operating expenses due to the change in our contingent consideration liability of $6.8 million.

(2) The net income (loss) for the years ended December 31, 2016, 2015 and 2014 included $0.6 million, $2.0 million and $2.0 million, respectively, of gain from settlement which was reflected as a reduction of operating costs and expenses.

(3) The net loss for the year ended December 31, 2018 included a $113.7 million impact of an increase in our deferred tax asset valuation allowance. The net loss for the year ended December 31, 2017 included a $21.5 million impact due to the recording of a deferred tax asset valuation allowance and $20.7 million related to re-measurement of deferred tax assets as a result of the tax law changes. The net income for the year ended December 31, 2015 included $174.5 million related to the reversal of the deferred tax asset valuation allowance.

(4) Stockholders' equity includes $50.0 million paid under the accelerated share repurchase program initiated in both March 2018 and May 2017, and $100.0 million paid under the accelerated share repurchase program initiated in October 2015 as well as the $174.5 million net impact of the reversal of the deferred tax asset valuation allowance.

(5) Reflects the impact from the adoption of ASC 606. See Note 3, "Recent Accounting Pronouncements," of Notes to Consolidated Financial Statements of this Form 10-K for further discussion.

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

This report contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 as described in more detail under "Note Regarding Forward-Looking Statements." Our forward-looking statements are based on current expectations, forecasts and assumptions and are subject to risks, uncertainties and changes in condition, significance, value and effect. As a result of the factors described herein, and in the documents incorporated herein by reference, including, in particular, those factors described under "Risk Factors," we undertake no obligation to publicly disclose any revisions to these forward-looking statements to reflect events or circumstances occurring subsequent to filing this report with the Securities and Exchange Commission.

The following discussion and analysis should be read in conjunction with the consolidated financial statements and related notes that are included elsewhere in this report.

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Executive Summary

We create innovative hardware, software and services that drive technology advancements from the data center to the mobile edge. Our architecture licenses, IP cores, chips, software and services span memory and interfaces, security and emerging technologies to positively impact the modern world. We collaborate with the industry, partnering with leading chip and system designers, foundries and service providers. Integrated into a wide array of devices and systems, our products power and secure diverse applications, including Big Data, Internet of Things (IoT) security, mobile payments and smart ticketing.

Highlights from our annual results were as follows:

- Revenue of $231.2 million;
- Operating Costs and Expenses of $318.2 million
- GAAP diluted net loss per share of $1.46;
- Net cash provided by operating activities of $87.1 million

In 2018, we had record product revenue for IP cores and server DIMM chips with wins at Tier 1 customers in the data center and communications segments worldwide. Additionally, our CryptoManager platform was selected to securely provision the Authenta™ based secure memory at Micron.

Business Overview

Dedicated to making data faster and safer, Rambus creates innovative hardware, software and services that drive technology advancements from the data center to the mobile edge. Our architecture licenses, IP cores, chips, software, and services span memory and interfaces, security, and emerging technologies to positively impact the modern world. We collaborate with the industry, partnering with leading chip and system designers, foundries, and service providers. Integrated into a wide array of devices and systems, our products power and secure diverse applications, including Big Data, Internet of Things (IoT) security, mobile payments, and smart ticketing.

Building upon the foundation of technologies for memory, SerDes and other chip interfaces, we have expanded our portfolio of inventions and solutions to address chip and system security, mobile payments and smart ticketing. We intend to continue our growth into new technology fields, consistent with our mission to create value through our innovations and to make those technologies available through the shipment of products, the delivery of services, and licensing business models. Key to our efforts is continuing to hire and retain world-class inventors, scientists and engineers to lead the development and deployment of inventions and technology solutions for our fields of focus.

Our strategy is to continue to augment our patent license business model to provide additional technology, products and services while creating and leveraging strategic synergies to increase revenue. In support of our strategy, Rambus has transitioned to focus on two key high-growth markets - the data center and the mobile edge - with an approach and product roadmap that leverage our core competencies and supplement with ingredient components to both differentiate and accelerate our position in complementary markets.

Organization

We have organized the business into three operational units: (1) Memory and Interfaces, or MID, which focuses on the design, development, manufacturing through partnerships and licensing of technology and solutions that is related to memory and interfaces; (2) Rambus Security, or RSD, which focuses on the design, development, deployment and licensing of technologies for chip, system and in-field application security, anti-counterfeiting, smart ticketing and mobile payments; and (3) Emerging Solutions, or ESD, which includes the Rambus Labs team and the development efforts in the area of emerging technologies.

On January 30, 2018, we announced our plans to close our lighting division and manufacturing operations in Brecksville, Ohio. We believe that such business was not core to our strategy and growth objectives. As of December 31, 2018, the lighting division has been wound down. Refer to Note 15, “Restructuring Charges” of Notes to Consolidated Financial Statements of this Form 10-K for additional details.

As of December 31, 2018, MID and RSD met quantitative thresholds for disclosure as reportable segments. Results for the remaining operating segments were shown under “Other.” For additional information concerning segment reporting, see Note 6, “Segments and Major Customers,” of Notes to Consolidated Financial Statements of this Form 10-K.

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Revenue Sources

On January 1, 2018, we adopted ASU No. 2014-09, Revenue from Contracts with Customers in Accounting Standards Codification (ASC) Topic 606 ("ASC 606", "the New Revenue Standard") and all the related amendments using the modified retrospective method. We recognized the cumulative effect of initially applying the New Revenue Standard of $626 million as an adjustment to the opening balance of accumulated deficit as of January 1, 2018. The prior period comparative information has not been restated and continues to be reported under ASC Topic 605, "Revenue Recognition" ("ASC 605") which was the accounting standards in effect for those periods.
The most significant impacts of the New Revenue Standard relate to the following:

- Revenue recognized for certain patent and technology licensing arrangements has changed under the New Revenue Standard. Revenue for (i) fixed-fee arrangements (including arrangements that include minimum guaranteed amounts), (ii) variable royalty arrangements that we have concluded are fixed in substance and (iii) the fixed portion of hybrid fixed/variable arrangements is recognized upon control over the underlying intellectual property ("IP") use right transferring to the licensee rather than upon billing under ASC 605, net of the effect of significant financing components calculated using customer-specific, risk-adjusted lending rates and recognized over time on an effective rate basis. As a consequence of the acceleration of revenue recognition and for matching purposes, all withholding taxes to be paid over the term of these licensing arrangements were expensed on the date the licensing revenue was recognized.

- Adoption of the New Revenue Standard resulted in revenue recognition being accelerated for variable royalties and the variable portion of hybrid fixed/variable patent and technology licensing arrangements. Under the New Revenue Standard, royalty revenue is being recognized on the basis of management's estimates of sales or usage, as applicable, of the licensed IP in the period of reference, with a true-up being recorded in subsequent periods based on actual sales or usage as reported by licensees (rather than upon receiving royalty reports from licensees as was the case under ASC 605).

- Adoption of the New Revenue Standard also resulted in revenue recognition being accelerated for certain professional services arrangements, including arrangements consisting of significant software customization or modification and development arrangements. Under the New Revenue Standard, such arrangements are accounted for based on man-days incurred during the reporting period as compared to estimated total man-days necessary for contract completion, as the customer either controls the asset as it is created or enhanced by us or, where the asset has no alternative use to us, we are entitled to payment for performance to date and expect to fulfill the contract. Revenue recognition is no longer capped to the lesser of inputs in the period or accepted billable project milestones as was the case under ASC 605.

As part of the adoption of the New Revenue Standard, we elected to apply the following practical expedients:

- We applied the practical expedient whereby we primarily charge commission costs to expense when incurred because the amortization period would be one year or less for the asset that would have been recognized from deferring these costs.

- We applied the practical expedient which allowed us to reflect the aggregate effect of all contract modifications occurring before the beginning of the earliest period presented when allocating the transaction price to performance obligations.

- We applied the practical expedient to not assess a contract asset or contract liability for a significant financing component if the period between the customer's payment and our transfer of goods or services is one year or less.

Our inventions and technology solutions are offered to our customers through patent, technology, software and IP core licenses, as well as product sales and services. Today, our primary source of revenue is derived from patent licenses, through which we provide our customers a license to use a certain portion of our broad portfolio of patented inventions. The license provides our customers with a defined right to use our innovations in the customer's own digital electronics products, systems or services, as applicable. The licenses may also define the specific field of use where our customers may use or employ our inventions in their products. License agreements are structured with fixed, variable or a hybrid of fixed and variable royalty payments over certain defined periods ranging for periods of up to ten years. Leading consumer product, industrial, semiconductor and system companies such as AMD, Broadcom, Cisco, Freescale, Fujitsu, IBM, Intel, Micron, Nanya, NVIDIA, Panasonic, Qualcomm, Renesas, Samsung, SK hynix, STMicroelectronics, Toshiba and Xilinx have licensed our patents. The vast majority of our patents were secured through our internal research and development efforts across all of our business units.

We also offer our customers technology licenses to support the implementation and adoption of our technology in their products or services. Our customers include leading companies such as IBM, Panasonic, Qualcomm, Samsung, Sony and Toshiba. Our technology license offerings include a range of technologies for incorporation into our customers' products and systems. We also offer a range of services as part of our technology licenses which can include know-how and technology transfer, product design and development, system integration, and other services. These technology license agreements may have both a fixed price (non-recurring) component and ongoing use fees and in some cases, royalties. Further, under technology licenses, our customers typically receive licenses to our patents necessary to implement these solutions in their products with specific rights and restrictions to the applicable patents elaborated in their individual contracts with us.

Revenues from royalties accounted for 56%, 74% and 79% of our consolidated revenue for the years ended December 31, 2018, 2017 and 2016, respectively.

The remainder of our revenue is product revenue, contract services and other revenue, which includes our product sales, IP core licenses, software licenses and related implementation, support and maintenance fees, and engineering services fees. The timing and amounts invoiced to customers can vary significantly depending on specific contract terms and can therefore have a significant impact on deferred revenue or account receivables in any given period. Product revenue accounted for 17%, 9% and 8% of our consolidated revenue for the years ended December 31, 2018, 2017 and 2016, respectively. Contract and other revenue accounted for 27%, 17% and 14% of our consolidated revenue for the years ended December 31, 2018, 2017 and 2016, respectively. As we continue to execute on our strategy to augment our traditional patent licensing business model to provide additional technology, products and services, product revenue and related cost of product revenue were reclassified from contract and other revenue and cost of contract and other revenue, respectively, during the second quarter of 2017.

Expenses

Cost of product revenue for 2018 decreased approximately $5.5 million to $18.3 million from $23.8 million as compared to 2017 primarily due to decreased cost of sales associated with the closure of the lighting division announced in the first quarter of 2018, offset by increased cost of sales associated with higher sales of memory products.

Engineering expenses continue to play a key role in our efforts to maintain product innovations. Our engineering expenses for 2018 decreased $10.8 million as compared to 2017 primarily due to decreased amortization costs of $11.4 million, prototyping costs of $1.8 million and depreciation expense of $1.4 million, offset by increased consulting expenses of $1.2 million, allocated information technology costs of $1.1 million, engineering development tool costs of $1.0 million and stock-based compensation expense of $0.4 million.

Sales, general and administrative expenses for 2018 decreased $7.0 million as compared to 2017 primarily due to decreased stock-based compensation expense of $6.0 million primarily due to the termination of our former chief executive officer at the end of June 2018, sales and marketing costs of $1.2 million and consulting costs of $1.1 million, offset by increased facilities costs of $1.0 million and recruiting costs of $0.6 million.

Intellectual Property

As of December 31, 2018, our semiconductor, lighting, security and other technologies are covered by 2,094 U.S. and foreign patents. Additionally, we have 557 patent applications pending. Some of the patents and pending patent applications are derived from a common parent patent application or are foreign counterpart patent applications. We have a program to file applications for and obtain patents in the United States and in selected foreign countries where we believe filing for such protection is appropriate and would further our overall business strategy and objectives. In some instances, obtaining appropriate levels of protection may involve prosecuting continuation and counterpart patent applications based on a common parent application. We believe our patented innovations provide our customers with the ability to achieve improved performance, lower risk, greater cost-effectiveness and other benefits in their products and services.

Trends

There are a number of trends that may have a material impact on us in the future, including but not limited to, the evolution of memory and SerDes technology, adoption of mobile payment, smart ticketing and security solutions, the use and adoption of our inventions or technologies generally, industry consolidation, and global economic conditions with the resulting impact on sales of consumer electronic systems. In addition, as discussed under “Results of Operations” below, our adoption of the New

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Revenue Standard will have a significant impact on our revenue trends as compared to prior periods in which we reported revenue under ASC 605.

We have a high degree of revenue concentration. Our top five customers for each reporting period represented approximately 49% of our revenue for 2018 as compared to 55% in 2017 and 63% in 2016. The particular customers which account for revenue concentration have varied from period-to-period as a result of the addition of new contracts, expiration of existing contracts, renewals of existing contracts, industry consolidation and the volumes and prices at which the customers have recently sold to their customers. These variations are expected to continue in the foreseeable future.

Our revenue from companies headquartered outside of the United States accounted for approximately 44% in 2018 as compared to 58% in 2017 and 64% in 2016. We expect that revenue derived from international customers will continue to represent a significant portion of our total revenue in the future. To date, the majority of the revenue from international customers has been denominated in U.S. dollars. However, to the extent that such customers' sales to their customers are not denominated in U.S. dollars, any revenue that we receive as a result of such sales could be subject to fluctuations in currency exchange rates. In addition, if the effective price of licensed products sold by our foreign customers were to increase as a result of fluctuations in the exchange rate of the relevant currencies, demand for licensed products could fall, which in turn would reduce our revenue. We do not use financial instruments to hedge foreign exchange rate risk. For additional information concerning international revenue, see Note 6, "Segments and Major Customers," of Notes to Consolidated Financial Statements of this Form 10-K.

Our licensing cycle for new licensees as well as renewals for existing licensees is lengthy, costly and unpredictable without any degree of certainty. We may incur costs in any particular period before any associated revenue stream begins, if at all. Our lengthy license negotiation cycles could make our future revenue difficult to predict because we may not be successful in entering into licenses with our customers in the amounts projected, or on our anticipated timelines.

The semiconductor industry is intensely competitive and highly cyclical, limiting our visibility with respect to future sales. To the extent that macroeconomic fluctuations negatively affect our principal customers, the demand for our products and technology may be significantly and adversely impacted and we may experience substantial period-to-period fluctuations in our operating results.

The royalties we receive from our semiconductor customers are partly a function of the adoption of our technologies by system companies. Many system companies purchase semiconductors containing our technologies from our customers and do not have a direct contractual relationship with us. Our customers generally do not provide us with details as to the identity or volume of licensed semiconductors purchased by particular system companies. As a result, we face difficulty in analyzing the extent to which our future revenue will be dependent upon particular system companies.

Global demand for effective security technologies continues to increase. In particular, highly integrated devices such as smart phones are increasingly used for applications requiring security such as mobile payments, corporate information and user data. Our RSD operating segment is primarily focused on positioning its DPA countermeasures, security cores, CryptoManager™ technology solutions, and the introduction of in-field applications mobile payments and smart ticketing solutions to our offerings to capitalize on these trends and growing adoption among technology partners and customers.

Cost of product revenue, engineering costs as well as sales, general and administrative expenses in the aggregate decreased and as a percentage of revenue increased in 2018 as compared to the prior year. In the near term, we expect these costs in the aggregate to be higher as we intend to continue to make investments in the infrastructure and technologies required to increase our product innovation in semiconductor, security, mobile payments, smart cards and other technologies. In addition, while we have not been involved in material litigation since 2014, to the extent litigation is again necessary, our expectations on the amount and timing of any future general and administrative costs are uncertain.

As a part of our overall business strategy, from time to time, we evaluate businesses and technologies for potential acquisition that are aligned with our core business and designed to supplement our growth, including the acquisitions of SCS, the assets of the Snowbush IP group and the Memory Interconnect Business during 2016. Similarly, we evaluate our current businesses and technologies that are not aligned with our core business for potential divestiture.

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Results of Operations

On January 1, 2018, we adopted ASC 606. Consistent with the modified retrospective adoption method, our results of operations for periods prior to our adoption of ASC 606 remain unchanged as revenue for the years ended December 31, 2017 and 2016 was recognized under ASC 605. Therefore, the periods are not directly comparable.

The adoption of ASC 606 limits the comparability of revenue and certain expenses presented in the results of operations for the year ended December 31, 2018, when compared to the same periods in 2017 and 2016. For additional information on the impact of the new accounting standard on our revenue, see Note 3, "Recent Accounting Pronouncements," of Notes to Consolidated Financial Statements of this Form 10-K.

The following table sets forth, for the periods indicated, the percentage of total revenue represented by certain items reflected in our consolidated statements of operations:

| | Years Ended December 31, | | | | | |
|---|---|---|---|---|---|---|
| | 2018 | | 2017 | | 2016 | |
| Revenue: | | | | | | |
| Royalties | 56.4 | % | 73.7 | % | 78.6 | % |
| Product revenue | 16.7 | % | 9.3 | % | 7.7 | % |
| Contract and other revenue | 26.9 | % | 17.0 | % | 13.7 | % |
| Total revenue | 100.0 | % | 100.0 | % | 100.0 | % |
| Operating costs and expenses: | | | | | | |
| Cost of product revenue* | 7.9 | % | 6.1 | % | 6.3 | % |
| Cost of contract and other revenue | 15.3 | % | 14.1 | % | 13.6 | % |
| Research and development* | 68.5 | % | 37.9 | % | 38.6 | % |
| Sales, general and administrative* | 44.9 | % | 28.2 | % | 28.3 | % |
| Restructuring charges | 1.0 | % | — | % | — | % |
| Impairment of in-process research and development intangible asset | — | % | — | % | 5.4 | % |
| Change in contingent consideration liability | — | % | — | % | (2.0 | )% |
| Gain from sale of intellectual property | — | % | (0.1 | )% | — | % |
| Gain from settlement | — | % | — | % | (0.2 | )% |
| Total operating costs and expenses | 137.6 | % | 86.2 | % | 90.0 | % |
| Operating income (loss) | (37.6 | )% | 13.8 | % | 10.0 | % |
| Interest income and other income (expense), net | 14.1 | % | 0.4 | % | 0.5 | % |
| Loss on extinguishment of debt | — | % | (0.3 | )% | — | % |
| Interest expense | (7.0 | )% | (3.5 | )% | (3.8 | )% |
| Interest and other income (expense), net | 7.1 | % | (3.4 | )% | (3.3 | )% |
| Income (loss) before income taxes | (30.5 | )% | 10.4 | % | 6.7 | % |
| Provision for income taxes | 37.8 | % | 16.2 | % | 4.7 | % |
| Net income (loss) | (68.3 | )% | (5.8 | )% | 2.0 | % |

* Includes stock-based compensation:

| | | | |
|---|---|---|---|
| Cost of product revenue | 0.0% | 0.0% | 0.0% |
| Research and development | 5.4% | 3.1% | 2.7% |
| Sales, general and administrative | 4.0% | 3.9% | 3.5% |

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Segment Results

Revenue from the MID reportable segment decreased approximately $112.2 million to $168.5 million for the year ended December 31, 2018 from $280.7 million for the year ended December 31, 2017. The decrease was primarily due to the adoption of ASC 606 in 2018 as discussed above, partially offset by higher volume of memory product sales.

Segment operating income from the MID reportable segment decreased approximately $121.2 million to $73.5 million for the year ended December 31, 2018 from $194.7 million for the year ended December 31, 2017. The decrease was primarily due to the decrease in revenue as discussed above, an increase in cost of sales related to higher sales of memory products, increased headcount related costs due to higher number of employees in 2018 and higher consulting costs, partially offset by lower prototyping costs.

Revenue from the RSD reportable segment decreased approximately $36.5 million to $60.2 million for the year ended December 31, 2018 from $96.7 million for the year ended December 31, 2017. The decrease was primarily due to the adoption of ASC 606 in 2018 as discussed above.

Segment operating income from the RSD reportable segment decreased approximately $39.6 million to $7.1 million for the year ended December 31, 2018 from $46.7 million for the year ended December 31, 2017. The decrease was primarily due to the decrease in revenue as discussed above, an increased headcount related costs due to higher number of employees in 2018, partially offset by lower cost of sales.

Revenue from the Other segment decreased approximately $13.3 million to $2.4 million for the year ended December 31, 2018 from $15.7 million for the year ended December 31, 2017. The decrease was due to the closing of our lighting division in the first quarter of 2018.

Segment operating loss from the Other segment decreased approximately $6.0 million to $12.1 million for the year ended December 31, 2018 from $18.1 million for the year ended December 31, 2017. The decrease was due to the closing of our lighting division in the first quarter of 2018.

Revenue from the MID reportable segment increased approximately $40.9 million to $280.7 million for the year ended December 31, 2017 from $239.8 million for the year ended December 31, 2016. The increase was primarily due to higher royalty revenue from Marvell Technology Group, a renewed license agreement with STMicroelectronics, Western Digital, Winbond Electronics, higher sales from technology projects and higher sales of memory products from the Memory Interconnect Business acquisition.

Segment operating income from the MID reportable segment increased approximately $23.3 million to $194.7 million for the year ended December 31, 2017 from $171.4 million for the year ended December 31, 2016. The increase was primarily due to increased revenue as discussed above, partially offset by increased headcount related costs due to higher number of employees and increased cost of sales related to sales of memory products.

Revenue from the RSD reportable segment increased approximately $20.5 million to $96.7 million for the year ended December 31, 2017 from $76.2 million for the year ended December 31, 2016. The increase was primarily due to higher royalty revenue from NVIDIA, Western Digital and higher revenue from Renesas and other security technology development projects, offset by lower royalty revenue from Xilinx.

Segment operating income from the RSD reportable segment increased approximately $22.4 million to $46.7 million for the year ended December 31, 2017 from $24.3 million for the year ended December 31, 2016. The increase was primarily due to increased revenue as discussed above and decreased headcount related costs, partially offset by increased consulting costs.

Revenue from the Other segment decreased approximately $4.9 million to $15.7 million for the year ended December 31, 2017 from $20.6 million for the year ended December 31, 2016. The decrease was primarily due to lower royalties from technology licenses associated with lighting products and decreased revenue from lighting technology development projects, offset by increased sales of light guide products.

Segment operating loss from the Other segment increased approximately $8.3 million to $18.1 million for the year ended December 31, 2017 from $9.8 million for the year ended December 31, 2016. The increase was primarily due to decreased revenue as discussed above.

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| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Total Revenue | | | | | |
| Royalties | $130.5 | $289.6 | $264.6 | (55.0)% | 9.4 % |
| Product revenue | 38.7 | 36.5 | 26.1 | 6.0 % | 40.1 % |
| Contract and other revenue | 62.0 | 67.0 | 45.9 | (7.4 )% | 45.9 % |
| Total revenue | $231.2 | $393.1 | $336.6 | (41.2)% | 16.8 % |

Royalty Revenue

Our royalty revenue, which includes patent and technology license royalties, decreased approximately $159.1 million to $130.5 million for the year ended December 31, 2018 from $289.6 million for 2017. The decrease was due primarily to the change in revenue recognition whereby we no longer recognize revenue at the time billings become due and collectable. Upon adoption of ASC 606 in the first quarter of 2018, we now recognize revenue at the inception of certain fixed-fee licensing arrangements when our performance obligations are met. Under the previous revenue recognition standard (ASC 605), our revenue for the year ended would have been higher as discussed under Note 3, "Recent Accounting Pronouncements," of Notes to Consolidated Financial Statements of this Form 10-K. With changes in revenue recognition due to the adoption of ASC 606 in 2018, our royalty revenue for 2018 was significantly lower than that for 2017 primarily due to the change from the adoption of ASC 606 as noted above. This accounting change will not impact billings or the cash flow from these arrangements. Furthermore, we may experience greater variability in quarterly and annual revenue in future periods as a result of the revenue accounting treatment applied to future fixed-fee licensing arrangements.

Our royalty revenue increased approximately $25.0 million to $289.6 million for the year ended December 31, 2017 from $264.6 million for 2016. The increase was due to higher royalty revenue from GLOBALFOUNDRIES, NVIDIA, Marvell Technology Group, a renewed license agreement with STMicroelectronics, Western Digital, Winbond Electronics, and various other customers, offset by lower royalty revenue from AMD, Broadcom, Eaton, Fujitsu, MediaTek, SK hynix, Xilinx, and various other customers.

We are continuously in negotiations for licenses with prospective customers. We expect patent royalties will continue to vary from period to period based on our success in adding new customers, renewing or extending existing agreements, as well as the level of variation in our customers' reported shipment volumes, sales price and mix, offset in part by the proportion of customer payments that are fixed or hybrid in nature. We also expect that our technology royalties will continue to vary from period to period based on our customers’ shipment volumes, sales prices, and product mix.

Royalty Revenue by Reportable Segment

Royalty revenue from the MID reportable segment decreased approximately $123.7 million to $105.4 million for the year ended December 31, 2018 from $229.1 million for 2017. The decrease was due to the adoption of ASC 606 in 2018 as discussed above.

Royalty revenue from the RSD reportable segment decreased approximately $33.8 million to $24.7 million for the year ended December 31, 2018 from $58.5 million for 2017. The decrease was due to the adoption of ASC 606 in 2018 as discussed above.

Royalty revenue from the Other segment decreased $1.6 million to $0.4 million for the year ended December 31, 2018 from $2.0 million for 2017. The decrease was due to the closing of our lighting division in the first quarter of 2018.

Royalty revenue from the MID reportable segment increased approximately $16.4 million to $229.1 million for the year ended December 31, 2017 from $212.7 million for 2016. The increase was due to higher royalty revenue from Marvell Technology Group, a renewed license agreement with STMicroelectronics, Western Digital, Winbond Electronics, and various other customers, offset by lower royalty revenue from AMD, Broadcom, MediaTek, SK hynix and Xilinx.

Royalty revenue from the RSD reportable segment increased approximately $11.6 million to $58.5 million for the year ended December 31, 2017 from $46.9 million for 2016. The increase was primarily due to higher royalty revenue from NVIDIA, Western Digital and various other customers, offset by lower royalty revenue from Xilinx.

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Royalty revenue from the Other segment decreased $3.1 million to $2.0 million for the year ended December 31, 2017 from $5.1 million for 2016. The decrease was due to lower royalties from technology licenses associated with lighting products.

Product Revenue

Product revenue consists of revenue from the sale of memory, security and lighting products. Product revenue increased approximately $2.2 million to $38.7 million for the year ended December 31, 2018 from $36.5 million for 2017. The increase was primarily due to higher sales of memory products, partially offset by lower sales of lighting products, as a result of closing our lighting division in the first quarter of 2018.

Product revenue increased approximately $10.4 million to $36.5 million for the year ended December 31, 2017 from $26.1 million for 2016. The increase was primarily due to sales of security products to Qualcomm and memory products from the Memory Interconnect Business.

We believe that product revenue will increase in 2019, mainly from the sale of our memory products. Our ability to continue to grow product revenue is dependent on, among other things, our ability to continue to obtain orders from customers and our ability to meet our customers' demands.

Product Revenue by Reportable Segments

Product revenue from the MID reportable segment increased approximately $16.1 million to $36.4 million for the year ended December 31, 2018 from $20.3 million for 2017, due to higher volume of memory product sales.

Product revenue from the RSD reportable segment decreased approximately $4.2 million to $1.4 million for the year ended December 31, 2018 from $5.6 million for 2017, primarily due to lower sales of security products.

Product revenue from the Other segment decreased approximately $9.7 million to $0.9 million for the year ended December 31, 2018 from $10.6 million for 2017. The decrease was due to lower sales of lighting products as a result of closing our lighting division in the first quarter of 2018.

Product revenue from the MID reportable segment increased approximately $7.4 million to $20.3 million for the year ended December 31, 2017 from $12.9 million for 2016, due to higher sales of memory products from the Memory Interconnect Business acquisition.

Product revenue from the RSD reportable segment increased approximately $1.9 million to $5.6 million for the year ended December 31, 2017 from $3.7 million for 2016, primarily due to higher revenue from Qualcomm, offset by lower sales to various other customers.

Product revenue from the Other segment increased approximately $1.1 million to $10.6 million for the year ended December 31, 2017 from $9.5 million for 2016, due to higher sales of light guide products.

Contract and Other Revenue

Contract and other revenue consists of revenue from technology development projects. Contract and other revenue decreased approximately $5.0 million to $62.0 million for the year ended December 31, 2018 from $67.0 million for 2017. The decrease was primarily due to lower revenue from various memory and lighting technology development projects, partially offset by higher revenue from various security technology development projects.

Contract and other revenue increased approximately $21.1 million to $67.0 million for the year ended December 31, 2017 from $45.9 million for 2016. The increase was primarily due to increased memory and security technology development projects, including revenue from the acquisitions during 2016, offset by decreased revenue from lighting technology development projects.

We believe that contract and other revenue will fluctuate over time based on our ongoing technology development contractual requirements, the amount of work performed, the timing of completing engineering deliverables, and the changes to work required, as well as new technology development contracts booked in the future.

Contract and Other Revenue by Reportable Segments

Contract and other revenue from the MID reportable segment decreased $4.5 million to $26.8 million for the year ended December 31, 2018 from $31.3 million for 2017, due to lower revenue from various memory technology projects.

Contract and other revenue from the RSD reportable segment increased approximately $1.6 million to $34.1 million for the year ended December 31, 2018 from $32.5 million for 2017, due to higher revenue from various security technology development projects.
Contract and other revenue from the Other segment decreased approximately $2.1 million to $1.1 million for the year ended December 31, 2018 from $3.2 million for 2017, due to lower revenue from our lighting technology development projects as a result of closing our lighting division in the first quarter of 2018.
Contract and other revenue from the MID reportable segment increased $17.0 million to $31.3 million for the year ended December 31, 2017 from $14.3 million for 2016, primarily due to higher revenue from GLOBALFOUNDRIES, Samsung and other memory technology projects, including revenue from the acquisitions in 2016.
Contract and other revenue from the RSD reportable segment increased approximately $6.9 million to $32.5 million for the year ended December 31, 2017 from $25.6 million for 2016, primarily due to higher revenue from Renesas and other security technology development projects, including revenue from the acquisitions in 2016.
Contract and other revenue from the Other segment decreased approximately $2.8 million to $3.2 million for the year ended December 31, 2017 from $6.0 million for 2016, primarily due to decreased revenue from lighting technology development projects.
Cost of product revenue:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Cost of product revenue | $18.3 | $23.8 | $21.3 | (23.1)% | 11.5 % |

Cost of product revenue are costs attributable to the sale of memory, security and lighting products.

For the year ended December 31, 2018 as compared to 2017, cost of product revenue decreased 23.1% primarily due to decreased cost of sales associated with the closure of the lighting division announced in the first quarter of 2018, offset by increased cost of sales associated with higher sales of memory products.
For the year ended December 31, 2017 as compared to 2016, cost of product revenue increased 11.5% primarily due to increased cost of sales associated with higher sales of memory products related to the Memory Interconnect Business acquisition in the second half of 2016.
In the near term, we expect costs of product revenue to be higher as we expect higher sales of our various products in 2019 as compared to 2018.
Engineering costs:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Engineering costs | | | | | |
| Cost of contract and other revenue | $11.7 | $20.3 | $16.1 | (42.1)% | 26.1 % |
| Amortization of intangible assets | 23.7 | 35.1 | 29.7 | (32.4)% | 18.2 % |
| Total cost of contract and other revenue | 35.4 | 55.4 | 45.8 | (36.1)% | 21.0 % |
| Research and development | 145.7 | 136.9 | 120.6 | 6.4 % | 13.5 % |
| Stock-based compensation | 12.6 | 12.2 | 9.2 | 3.3 % | 33.0 % |
| Total research and development | 158.3 | 149.1 | 129.8 | 6.2 % | 14.9 % |
| Total engineering costs | $193.7 | $204.5 | $175.6 | (5.3 )% | 16.5 % |

Engineering costs are allocated between cost of contract and other revenue and research and development expenses. Cost of contract and other revenue reflects the portion of the total engineering costs which are specifically devoted to individual customer development and support services as well as amortization expense related to various acquired intellectual property for patent licensing. The balance of engineering costs, incurred for the development of applicable technologies, is charged to

research and development. In a given period, the allocation of engineering costs between these two components is a function of the timing of the development and implementation schedules of individual customer contracts.
For the year ended December 31, 2018 as compared to 2017, total engineering costs decreased 5.3% primarily due to decreased amortization costs of $11.4 million, prototyping costs of $1.8 million and depreciation expense of $1.4 million, offset by increased consulting expenses of $1.2 million, engineering development tool costs of $1.0 million, allocated information technology costs of $1.1 million and stock-based compensation expense of $0.4 million.
For the year ended December 31, 2017 as compared to 2016, total engineering costs increased 16.5% primarily due to increased headcount related expenses of $8.1 million, increased expenses related to software design tools of $5.5 million, increased amortization costs of $5.4 million, increased costs associated with engineering services of $4.2 million, increased stock-based compensation expense of $3.0 million, increased prototyping costs of $2.4 million, increased travel costs of $0.9 million, increased bonus accrual expense of $0.8 million and increased consulting costs of $0.6 million, offset by lower depreciation expense of $1.6 million. Most of the increases were primarily due to business acquisitions during 2016.
In the near term, we expect engineering costs to be higher as we continue to make investments in the infrastructure and technologies required to maintain our product innovation in semiconductor, security and other technologies.
Sales, general and administrative costs:

| | Years Ended December 31, | | | 2017 to 2018 Change | 2016 to 2017 Change |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | | |
| | (Dollars in millions) | | | | |
| Sales, general and administrative costs | | | | | |
| Sales, general and administrative costs | $94.8 | $95.8 | $83.3 | (1.1 )% | 14.9 % |
| Stock-based compensation | 9.1 | 15.1 | 11.8 | (39.6)% | 28.4 % |
| Total sales, general and administrative costs | $103.9 | $110.9 | $95.1 | (6.3 )% | 16.6 % |

Sales, general and administrative expenses include expenses and costs associated with trade shows, public relations, advertising, litigation, general legal, insurance and other sales, marketing and administrative efforts. Litigation expenses have historically been a significant portion of our sales, general and administrative expenses. Consistent with our business model, our licensing, sales and marketing activities aim to develop or strengthen relationships with potential new and current customers. In addition, we work with current customers through marketing, sales and technical efforts to drive adoption of their products that use our innovations and solutions, by system companies. Due to the long business development cycles we face and the semi-fixed nature of sales, general and administrative expenses in a given period, these expenses generally do not correlate to the level of revenue in that period or in recent or future periods.
For the year ended December 31, 2018 as compared to 2017, total sales, general and administrative costs decreased 6.3% primarily due to decreased stock-based compensation expense of $6.0 million primarily due to the termination of our former chief executive officer at the end of June 2018, consulting costs of $1.1 million and sales and marketing costs of $1.2 million, offset by increased facilities costs of $1.0 million and recruiting costs of $0.6 million.
For the year ended December 31, 2017 as compared to 2016, total sales, general and administrative costs increased 16.6% primarily due to increased headcount related expenses of $5.4 million, increased stock-based compensation expense of $3.3 million, increased bonus accrual expense of $3.1 million, increased sales and marketing expenses of $2.6 million, increased consulting costs of $2.2 million and increased travel costs of $1.3 million, offset by decreased acquisition related costs of $3.1 million. Most of the increases were primarily due to business acquisitions during 2016.
In the future, sales, general and administrative costs will vary from period to period based on the trade shows, advertising, legal, acquisition and other sales, marketing and administrative activities undertaken, and the change in sales, marketing and administrative headcount in any given period. In the near term, we expect our sales, general and administrative costs to remain relatively flat.

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Restructuring charges:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Restructuring charges | $ 2.2 | $ — | $ — | 100.0 % | 0.0 % |

During the first quarter of 2018, we announced our plans to close our lighting division and manufacturing operations in Brecksville, Ohio. We believed that such business was not core to our strategy and growth objectives. As a result, we recorded a charge of $2.2 million related to employee terminations and severance costs, and facility related costs. During 2017 and 2016, we did not initiate any restructuring programs.

Refer to Note 15, "Restructuring Charges," of Notes to Consolidated Financial Statements of this Form 10-K for further discussion.

Impairment of in-process research and development intangible asset:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Impairment of in-process research and development intangible asset | $ — | $ — | $ 18.3 | — % | (100.0)% |

During 2018 and 2017, we did not record a charge for the impairment of any intangible assets or goodwill.

During the fourth quarter of 2016, we recorded a charge of $18.3 million related to the impairment of the in-process research and development intangible asset acquired in the acquisition of Snowbush IP. The impairment of this intangible asset resulted from a delay in the market served by this initiative. This delay will not impact the short-term revenue expectations but may impact our revenue expectations several years into the future. This impairment was partially offset by a $6.8 million reduction of acquisition purchased consideration related to this product line.

Change in contingent consideration liability:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Change in contingent consideration liability | $ — | $ — | $ (6.8 ) | — % | (100.0)% |

During the fourth quarter of 2016, we recorded a reduction in our contingent consideration liability of $6.8 million resulting in a gain in our Consolidated Statements of Operations of this Form 10-K. See the "Impairment of in-process research and development intangible asset" section discussed above for further details.

Interest and other income (expense), net:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Interest income and other income (expense), net | $32.6 | $1.4 | $1.7 | NM* | (20.5 )% |
| Loss on extinguishment of debt | — | (1.1 ) | — | (100.0)% | 100.0 % |
| Interest expense | (16.3 ) | (13.7 ) | (12.7 ) | 18.7 % | 7.7 % |
| Interest and other income (expense), net | $16.3 | $(13.4) | $(11.0) | NM* | 21.9 % |

* NM — percentage is not meaningful

Interest income and other income (expense), net, consists primarily of interest income related to the interest income of $27.2 million for the year ended December 31, 2018 due to the significant financing component of licensing agreements as a result of the adoption of the New Revenue Standard as of January 1, 2018 as well as interest income generated from investments in high quality fixed income securities and any gains or losses from the re-measurement of our monetary assets or liabilities denominated in foreign currencies.

Loss on extinguishment of debt relates to the extinguishment of a portion of the 2018 Notes during 2017. See Note 10, “Convertible Notes,” of Notes to Consolidated Financial Statements of this Form 10-K for additional details.
Interest expense consists of interest expense associated with our imputed facility lease obligations on the Sunnyvale and Ohio facilities and non-cash interest expense related to the amortization of the debt discount and issuance costs on the 1.375% convertible senior notes due 2023 (the “2023 Notes”) and the 1.125% convertible senior notes due 2018 (the “2018 Notes”), as well as the coupon interest related to these notes. Interest expense increased in 2018 as compared to the same period in 2017 primarily due to the full year of interest expense related to the 2023 Notes offset by the maturing of the 2018 Notes in the third quarter of 2018. Interest expense increased in 2017 as compared to the same period in 2016 primarily due to the issuance of the 2023 Notes in the fourth quarter of 2017. For the years ended December 31, 2018, 2017 and 2016, we recognized $4.3 million, $4.4 million and $4.4 million, respectively, of interest expense in connection with the imputed financing obligations in our statements of operations. We expect our non-cash interest expense to increase steadily as the notes reach maturity. See Note 10, “Convertible Notes,” of Notes to Consolidated Financial Statements of this Form 10-K for additional details.
Provision for income taxes:

| | Years Ended December 31, | | | 2017 to 2018 | 2016 to 2017 |
|---|---|---|---|---|---|
| | 2018 | 2017 | 2016 | Change | Change |
| | (Dollars in millions) | | | | |
| Provision for income taxes | $87.3 | $63.9 | $15.8 | 36.8 % | NM* |
| Effective tax rate | (123.6)% | 155.8 % | 69.9 % | | |

*NM — percentage is not meaningful

Our effective tax rate for the year ended December 31, 2018 was different from the U.S. statutory tax rate primarily due to the establishment of a full valuation allowance on U.S. federal deferred tax assets. Our effective tax rate for the year ended December 31, 2017 was different from the U.S. statutory rate primarily due to the deferred tax asset valuation allowance on expiring 2010 foreign tax credits and certain federal research and development credits, and the re-measurement of deferred taxes from a 35% to 21% tax rate due to U.S. tax reform. Our effective tax rate for the year ended December 31, 2016 was different from the U.S. statutory rate primarily due to income tax expense recognized from exercises and expiration of out-of-the-money fully vested shares from our equity incentive plans.

We recorded a provision for incomes taxes of $87.3 million for the year ended December 31, 2018, which primarily resulted from establishing a full valuation allowance on our U.S. federal deferred tax assets. For the year ended December 31, 2018, we paid withholding taxes of $20.4 million. We recorded a provision for incomes taxes of $63.9 million for the year ended December 31, 2017, which was primarily comprised of our valuation allowance on unused 2010 foreign tax credits and certain federal research and development credits, and our deferred taxes re-measurements following U.S. tax reform. For the year ended December 31, 2017, we paid withholding taxes of $20.5 million. We recorded a provision for income taxes of $15.8 million for the year ended December 31, 2016, which was primarily compromised of withholding taxes, other foreign taxes and current state taxes. For the year ended December 31, 2016, we paid withholding taxes of $22.0 million.
On December 22, 2017, the Tax Cuts and Jobs Act ("the Tax Act") was enacted into law in the United States. The Tax Act, among other things, lowered U.S. corporate income tax rates from 35% to 21%, implemented a territorial tax system, and imposed a one-time transition tax on deemed repatriated earnings of non-U.S. subsidiaries.
The U.S. tax law changes, including limitations on various business deductions such as executive compensation under Internal Revenue Code §162(m), will not impact our federal tax expense in the short-term due to our tax credit carryovers and associated valuation allowance. The Tax Act’s new international rules, including Global Intangible Low-Taxed Income (“GILTI”), Foreign Derived Intangible Income (“FDII”), and Base Erosion Anti-Avoidance Tax (“BEAT”) are effective beginning in 2018. We have included these effects of the Tax Act in our financial statements.
We periodically evaluate the realizability of our net deferred tax assets based on all available evidence, both positive and negative. During the third quarter of 2018, we assessed the changes in our underlying facts and circumstances and

evaluated the realizability of our existing deferred tax assets based on all available evidence, both positive and negative, and the weight accorded to each, and concluded a full valuation allowance associated with U.S. federal and California deferred tax assets was appropriate. The basis for this conclusion was derived primarily from the fact that we completed our forecasting process during the third quarter of 2018. At a domestic level, losses are expected in future periods in part due to the impact of the adoption of ASC 606. In addition, the decrease in the U.S. federal tax rate from 35% to 21% as a result of U.S. tax reform has further reduced our ability to utilize our deferred tax assets. In light of the above factors, we concluded that it is not more likely than

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not that we can realize our U.S. deferred tax assets. As such, we have set up and maintain a full valuation allowance against our U.S. federal deferred tax assets.

Liquidity and Capital Resources

| | December 31, 2018 | December 31, 2017 |
|---|---|---|
| | (In millions) | |
| Cash and cash equivalents | $115.9 | $ 225.9 |
| Marketable securities | 161.9 | 103.5 |
| Total cash, cash equivalents, and marketable securities | $277.8 | $ 329.4 |

| | Years Ended December 31, 2018 | 2017 | 2016 |
|---|---|---|---|
| | (In millions) | | |
| Net cash provided by operating activities | $87.1 | $117.4 | $95.6 |
| Net cash used in investing activities | $(68.0 ) | $(75.5 ) | $(105.2) |
| Net cash provided by (used in) financing activities | $(127.7) | $46.5 | $2.7 |

Liquidity

We currently anticipate that existing cash, cash equivalents and marketable securities balances and cash flows from operations will be adequate to meet our cash needs for at least the next 12 months. Additionally, the majority of our cash and cash equivalents is in the United States. Our cash needs for the year ended December 31, 2018 were funded primarily from cash collected from our customers.

We do not anticipate any liquidity constraints as a result of either the current credit environment or investment fair value fluctuations. Additionally, we have the intent and ability to hold our debt investments that have unrealized losses in accumulated other comprehensive gain (loss) for a sufficient period of time to allow for recovery of the principal amounts invested. Additionally, we have no significant exposure to European sovereign debt. We continually monitor the credit risk in our portfolio and mitigate our credit risk exposures in accordance with our policies.

As a part of our overall business strategy, from time to time, we evaluate businesses and technologies for potential acquisitions that are aligned with our core business and designed to supplement our growth.

To provide us with more flexibility in returning capital back to our stockholders, on January 21, 2015, our Board authorized a share repurchase program authorizing the repurchase of up to an aggregate of 20.0 million shares. During the first quarter of 2018, we entered into an accelerated share repurchase program with Citibank N.A. to repurchase an aggregate of $50.0 million of our common stock and received an initial delivery of 3.1 million shares, which were retired and recorded as a $40.0 million reduction to stockholders' equity. The remaining $10.0 million of the initial payment was recorded as a reduction to stockholders' equity as an unsettled forward contract indexed to our stock. During the second quarter of 2018, the accelerated share repurchase program was completed and we received an additional 0.7 million shares of our common stock as the final settlement of the accelerated share repurchase program. We may continue to tactically execute our share repurchase program from time to time.

As of December 31, 2018, there remained an outstanding authorization to repurchase approximately 3.6 million shares of our outstanding common stock under the current share repurchase program. See “Share Repurchase Program” below.

Operating Activities

Cash provided by operating activities of $87.1 million for the year ended December 31, 2018 was primarily attributable to the cash generated from customer licensing, software license and related implementation, support and maintenance fees, product sales and engineering services fees. Changes in operating assets and liabilities for the year ended December 31, 2018 primarily included increases in unbilled receivables, accounts receivable and prepaids and other current assets, offset by decreases in accounts payable and accrued salaries and benefits and other liabilities.

Cash provided by operating activities of $117.4 million for the year ended December 31, 2017 was primarily attributable to cash generated from customer licensing, software license and related implementation, support and maintenance fees, product sales and engineering services fees. Changes in operating assets and liabilities for the year ended December 31, 2017 primarily included increases in accounts receivable and accrued salaries and benefits and other liabilities as well as decreases in prepaids and other current assets.

Cash provided by operating activities of $95.6 million for the year ended December 31, 2016 was primarily attributable to the cash generated from customer licensing, software license and related implementation, support and maintenance fees, product sales and engineering services fees. Changes in operating assets and liabilities for the year ended December 31, 2016 primarily included a decrease in accrued salaries and benefits and other liabilities mainly due to the payout of the Corporate Incentive Plan and increases in deferred revenue and inventory.

Investing Activities

Cash used in investing activities of $68.0 million for the year ended December 31, 2018 primarily consisted of purchases of available-for-sale marketable securities of $282.1 million, $10.8 million paid to acquire property, plant and equipment and $3.0 million paid for investment in a privately held company, offset by proceeds from the maturities of available-for-sale marketable securities of $223.1 million, proceeds from the sale of assets held for sale of $3.8 million and proceeds from the sale of an equity security of $1.3 million.

Cash used in investing activities of $75.5 million for the year ended December 31, 2017 primarily consisted of cash paid for purchases of available-for-sale marketable securities of $102.5 million and $9.4 million paid to acquire property, plant and equipment, offset by proceeds from the maturities and sales of available-for-sale marketable securities of $32.0 million and $4.5 million, respectively.

Cash used in investing activities of $105.2 million for the year ended December 31, 2016 primarily consisted of cash paid for the acquisition of SCS of $92.6 million, net of cash acquired of $12.1 million, cash paid for the acquisition of the Memory Interconnect Business of $90.0 million, cash paid for the acquisition of the assets of the Snowbush IP group assets of $32.0 million, cash paid for purchases of available-for-sale marketable securities of $54.9 million, $8.6 million paid to acquire property, plant and equipment, offset by proceeds from the maturities and sales of available-for-sale marketable securities of $110.1 million and $50.5 million, respectively.

Financing Activities

Cash used in financing activities was $127.7 million for the year ended December 31, 2018 and was primarily due to the repayment of the remaining aggregate principal of the 2018 Notes amounting to $81.2 million, which became due in August 2018, an aggregate payment of $50.0 million to Citibank N.A., as part of our accelerated share repurchase program, and $6.8 million in payments of taxes on restricted stock units, offset by $11.4 million proceeds from the issuance of common stock under equity incentive plans.

Cash provided by financing activities was $46.5 million for the year ended December 31, 2017 and was primarily due to $172.5 million from the issuance of the 2023 Notes, $23.2 million from the issuance of warrants and $15.8 million proceeds from the issuance of common stock under equity incentive plans, offset by $72.3 million paid for the repurchase of $56.8 million aggregate principal amount of the 2018 Notes and $15.5 million paid primarily for the conversion feature of the repurchased 2018 Notes, an aggregate payment of $50.0 million to Barclays Bank PLC, as part of our accelerated share repurchase program, $33.5 million related to the purchase of the Convertible Note Hedge Transactions, $5.1 million in payments of taxes on restricted stock units and $3.3 million in issuance costs related to the issuance of the 2023 Notes.

Cash provided by financing activities was $2.7 million for the year ended December 31, 2016. We received proceeds of $15.4 million from the issuance of common stock under equity incentive plans, offset by the payment of the additional purchase consideration from the SCS acquisition of $10.2 million and $3.1 million in payments of taxes on restricted stock units.

Contractual Obligations

On December 15, 2009, we entered into a lease agreement for approximately 125,000 square feet of office space located at 1050 Enterprise Way in Sunnyvale, California commencing on July 1, 2010 and expiring on June 30, 2020. The office space is used for our corporate headquarters, as well as engineering, sales, marketing and administrative operations and activities. We have two options to extend the lease for a period of 60 months each and a one-time option to terminate the lease after 84 months in exchange for an early termination fee. Pursuant to the terms of the lease, the landlord agreed to reimburse us approximately $9.1 million, which was received by the year ended December 31, 2011. We recognized the reimbursement as an additional imputed financing obligation as such payment from the landlord is deemed to be an imputed financing obligation. On November 4, 2011, to better plan for future expansion, we entered into an amended lease for our Sunnyvale facility for approximately an additional 31,000 square feet of space commencing on March 1, 2012 and expiring on June 30, 2020. Additionally, a tenant improvement allowance to be provided by the landlord was approximately $1.7 million. On September 29, 2012, we entered into a second amended Sunnyvale lease to reduce the tenant improvement allowance to approximately $1.5 million. On January 31, 2013, we entered into a third amendment to the Sunnyvale lease to surrender the 31,000 square-foot space from the first amendment back to the landlord and recorded a total charge of $2.0 million related to the surrender of the amended lease.

On March 8, 2010, we entered into a lease agreement for approximately 25,000 square feet of office and manufacturing areas, located in Brecksville, Ohio. The office space was used for RLD's engineering activities while the manufacturing space is used for the manufacturer of prototypes. This lease was amended on September 29, 2011 to expand the facility to approximately 51,000 total square feet and the amended lease will expire on July 31, 2019. We have an option to extend the lease for a period of 60 months. On January 30, 2018, we announced our plans to close our lighting division and manufacturing operations in Brecksville, Ohio, and began the process to exit the facilities and sell the related equipment. Refer to Note 15, "Restructuring Charges," of Notes to Consolidated Financial Statements of this Form 10-K for additional details.

We undertook a series of structural improvements to ready the Sunnyvale and Brecksville facilities for our use. Since certain improvements to be constructed by us were considered structural in nature and we were responsible for any cost overruns, for accounting purposes, we were treated in substance as the owner of the construction project during the construction period. At the completion of each construction, we concluded that we retained sufficient continuing involvement to preclude de-recognition of the building under the FASB authoritative guidance applicable to the sale leasebacks of real estate. As such, we continue to account for the building as owned real estate and to record an imputed financing obligation for our obligation to the legal owners.

Monthly lease payments on the facility are allocated between the land element of the lease (which is accounted for as an operating lease) and the imputed financing obligation. The imputed financing obligation is amortized using the effective interest method and the interest rate was determined in accordance with the requirements of sale leaseback accounting. For the years ended December 31, 2018, 2017 and 2016, we recognized in our Consolidated Statements of Operations $4.3 million, $4.4 million and $4.4 million, respectively, of interest expense in connection with the imputed financing obligation on these facilities. At December 31, 2018 and 2017, the imputed financing obligation balance in connection with these facilities was $37.6 million and $38.3 million, respectively, which was primarily classified under long-term imputed financing obligation.

On November 17, 2017, we entered into an Indenture with U.S. Bank, National Association, as trustee, relating to the issuance by us of $172.5 million aggregate principal amount of the 2023 Notes. The aggregate principal amount of the 2023 notes as of December 31, 2018 was $172.5 million, offset by unamortized debt discount and unamortized debt issuance costs of $28.5 million and $2.0 million, respectively, on the accompanying consolidated balance sheets. The unamortized discount related to the 2023 Notes is being amortized to interest expense using the effective method over the remaining 4.1 years until maturity of the 2023 Notes on February 1, 2023. See Note 10, “Convertible Notes,” of Notes to Consolidated Financial Statements of this Form 10-K for additional details.

As of December 31, 2018, our material contractual obligations are as follows (in thousands):

| | Total | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|
| Contractual obligations (1) | | | | | | |
| Imputed financing obligation (2) | $8,081 | $5,677 | $2,404 | $— | $— | $— |
| Leases and other contractual obligations | 20,548 | 5,999 | 5,117 | 5,193 | 3,271 | 968 |
| Software licenses (3) | 12,002 | 7,510 | 2,995 | 1,497 | — | — |
| Convertible notes | 172,500 | — | — | — | — | 172,500 |
| Interest payments related to convertible notes | 10,680 | 2,372 | 2,372 | 2,372 | 2,372 | 1,192 |
| Total | $223,811 | $21,558 | $12,888 | $9,062 | $5,643 | $174,660 |

(1) The above table does not reflect possible payments in connection with uncertain tax benefits of approximately $23.5 million including $21.4 million recorded as a reduction of long-term deferred tax assets and $2.1 million in long-term income taxes payable, as of December 31, 2018. As noted in Note 16, "Income Taxes," of Notes to Consolidated Financial Statements of this Form 10-K, although it is possible that some of the unrecognized tax benefits could be settled within the next 12 months, we cannot reasonably estimate the outcome at this time.

(2) With respect to the imputed financing obligation, the main components of the difference between the amount reflected in the contractual obligations table and the amount reflected on the Consolidated Balance Sheets are the interest on the imputed financing obligation and the estimated common area expenses over the future periods. The amount includes the amended Ohio lease and the amended Sunnyvale lease.

(3) We have commitments with various software vendors for agreements generally having terms longer than one year.

Share Repurchase Program

On January 21, 2015, our Board approved a share repurchase program authorizing the repurchase of up to an aggregate of 20.0 million shares. Share repurchases under the plan may be made through the open market, established plans or privately negotiated transactions in accordance with all applicable securities laws, rules, and regulations. There is no expiration date applicable to the plan.

On March 5, 2018, we initiated an accelerated share repurchase program with Citibank N.A. The accelerated share repurchase program is part of the broader share repurchase program previously authorized by the Company's Board on January 21, 2015. Under the accelerated share repurchase program, we pre-paid to Citibank N.A., the $50.0 million purchase price for our common stock and, in turn, we received an initial delivery of approximately 3.1 million shares of our common stock from Citibank N.A., in the first quarter of 2018, which were retired and recorded as a $40.0 million reduction to stockholders' equity. The remaining $10.0 million of the initial payment was recorded as a reduction to stockholders' equity as an unsettled forward contract indexed to our stock. During the second quarter of 2018, the accelerated share repurchase program was completed and we received an additional 0.7 million shares of our common stock as the final settlement of the accelerated share repurchase program. There were no other repurchases of our common stock during 2018.

On May 1, 2017, we initiated an accelerated share repurchase program with Barclays Bank PLC. The accelerated share repurchase program is part of the broader share repurchase program previously authorized by our Board on January 21, 2015. Under the accelerated share repurchase program, we pre-paid to Barclays Bank PLC, the $50.0 million purchase price for our common stock and, in turn, we received an initial delivery of approximately 3.2 million shares of our common stock from Barclays Bank PLC, in the second quarter of 2017, which were retired and recorded as a $40.0 million reduction to stockholders' equity. The remaining $10.0 million of the initial payment was recorded as a reduction to stockholders' equity as an unsettled forward contract indexed to our stock. The number of shares to be ultimately purchased by us was determined based on the volume weighted average price of the common stock during the terms of the transaction, minus an agreed upon discount between the parties. During the fourth quarter of 2017, the accelerated share repurchase program was completed and we received an additional 0.8 million shares of our common stock as the final settlement of the accelerated share repurchase program. There were no other repurchases of our common stock during 2017.

On October 26, 2015, we initiated an accelerated share repurchase program with Citibank, N.A. The accelerated share repurchase program is part of the broader share repurchase program previously authorized by our Board on January 21, 2015. Under the accelerated share repurchase program, we pre-paid to Citibank, N.A., the $100.0 million purchase price for our common stock and, in turn, we received an initial delivery of approximately 7.8 million shares of our common stock from Citibank, N.A, in the fourth quarter of 2015, which were retired and recorded as a $80.0 million reduction to stockholders' equity. The remaining $20.0 million of the initial payment was recorded as a reduction to stockholders' equity as an unsettled forward contract indexed to our stock. The number of shares to be ultimately purchased by us was determined based on the volume weighted average price of the common stock during the terms of the transaction, minus an agreed upon discount between the parties. During the second quarter of 2016, the accelerated share repurchase program was completed and we received an additional 0.7 million shares of our common stock as the final settlement of the accelerated share repurchase program. There were no other repurchases of our common stock during 2016.

As of December 31, 2018, there remained an outstanding authorization to repurchase approximately 3.6 million shares of our outstanding common stock under the current share repurchase program.

We record stock repurchases as a reduction to stockholders' equity. We record a portion of the purchase price of the repurchased shares as an increase to accumulated deficit when the price of the shares repurchased exceeds the average original proceeds per share received from the issuance of common stock.

Warrants

In connection with the 2023 Notes, we separately entered into privately negotiated warrant transactions, whereby we sold to the Counterparties warrants (the “Warrants”) to acquire, collectively, subject to anti-dilution adjustments, approximately 9.1 million shares of our common stock at an initial strike price of approximately $23.30 per share, which represents a premium of 60% over the last reported sale price of our common stock of $14.56 on November 14, 2017. We received aggregate proceeds of approximately $23.2 million from the sale of the Warrants to the Counterparties. The Warrants are separate transactions and are not part of the 2023 Notes or Convertible Note Hedge Transactions. Holders of the 2023 Notes and Convertible Note Hedge Transactions will not have any rights with respect to the Warrants. See Note 10, “Convertible Notes,” of Notes to Consolidated Financial Statements of this Form 10-K for additional details.

Critical Accounting Policies and Estimates

The discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue and expenses, and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates, including those related to revenue recognition, investments, income taxes, litigation and other contingencies. We base our estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

We believe the following critical accounting policies affect our more significant judgments and estimates used in the preparation of our consolidated financial statements.

Revenue Recognition

Overview

We recognize revenue upon transfer of control of promised goods and services in an amount that reflects the consideration we expect to receive in exchange for those goods and services. Unless indicated otherwise below, all of the goods and services are distinct and are accounted for as separate performance obligations.

Where an arrangement includes multiple performance obligations, the transaction price is allocated to these on a relative standalone selling prices basis. We have established standalone selling prices for all of our offerings - specifically, a same pricing methodology is consistently applied to all licensing arrangements; all services offerings are priced within tightly controlled bands and all contracts that include support and maintenance state a renewal rate or price that is systematically enforced.

Our revenue consists of royalty, product and contract and other revenue. Royalty revenue consists of patent and technology license royalties. Products consist of memory buffer chipsets sold directly and indirectly to module manufacturers and OEMs worldwide through multiple channels, including our direct sales force and distributors. Contract and other revenue consists of software license fees, engineering fees associated with integration of our technology solutions into our customers' products and support and maintenance fees.

Royalty Revenue

Our patent and technology licensing arrangements generally range between 1 and 7 years in duration and generally grant the licensee the right to use our entire IP portfolio as it evolves over time. These arrangements do not typically grant the licensee the right to terminate for convenience and where such rights exist, termination is prospective, with no refund of fees already paid by the licensee. There is no interdependency or interrelation between the IP included in the portfolio licensed upon contract inception and any IP subsequently made available to the licensee, and we would be able to fulfill our promises by transferring the portfolio and the additional IP use rights independently. However, the numbers of additions to, and removals from the portfolio (for example when a patent expires and renewal is not granted to us) in any given period have historically been relatively consistent; as such, we do not allocate the transaction price between the rights granted at contract inception and those subsequently granted over time as a function of these additions.

Patent and technology licensing arrangements result in fixed payments received over time, with guaranteed minimum payments on occasion, variable payments calculated based on the licensee's sale or use of the IP, or a mix of fixed and variable payments.

- For fixed-fee arrangements (including arrangements that include minimum guaranteed amounts), variable royalty arrangements that we have concluded are fixed in substance and the fixed portion of hybrid fixed/variable arrangements, we recognize revenue upon control over the underlying IP use right transferring to the licensee, net of the effect of significant financing components calculated using customer-specific, risk-adjusted lending rates ranging between 3% and 6%, with the related interest income being recognized over time on an effective rate basis. Where a licensee has the contractual right to terminate a fixed-fee arrangement for convenience without any substantive penalty payable upon such termination, we apply the guidance in the New Revenue Standard to the duration of the contract in which the parties have present enforceable rights and obligations and only recognizes revenue for amounts that are due and payable.

- For variable arrangements, we recognize revenue based on an estimate of the licensee's sale or usage of the IP during the period of reference, typically quarterly, with a true-up being recorded when we receive the actual royalty report from the licensee.

Product Revenue

Product revenue is recognized upon shipment of product to customers, net of accruals for estimated sales returns and allowances, and to distributors, net of accruals for price protection and rights of return on products unsold by the distributors. To date, none of these accruals have been significant. We transact with direct customers primarily pursuant to standard purchase orders for delivery of products and generally allow customers to cancel or change purchase orders within limited notice periods prior to the scheduled shipment date.

Contract and Other Revenue

Contract and other revenue consists of software license fees and engineering fees associated with integration of our technology solutions into our customers' solutions (or products) and related support and maintenance.

An initial software arrangement generally consists of a term-based or perpetual license, significant software customization services and support and maintenance services that include post-implementation customer support and the right to unspecified software updates and enhancements on a when and if available basis. We recognize the license and customization services revenue based on man-days incurred during the reporting period as compared to the estimated total man-days necessary for each contract, and the support and maintenance revenue ratably over the term. We recognize license renewal revenue at the beginning of the renewal period. We recognize revenue from professional services purchased in addition to an initial software arrangement on a cumulative catch-up basis if these services are not distinct from the services provided as part of the initial software arrangement, or as a separate contract if these services are distinct.

During the first quarter of 2016, we acquired Smart Card Software Ltd., which included Bell Identification Ltd. (Payment Product Group) and Ecebs Ltd. (Ticketing Products Group), which transact mostly in software and Software-as-a-Service arrangements, respectively.

Our Payment Product Group derives a significant portion of its revenue from heavily customized software in the mobile market, whereby the Payment Product Group’s software solution interacts with third-party solutions and other payment platforms to provide the functionality the customer requires. Historically, these third-party solutions have evolved at a rapid pace, with the Payment Product Group being required to deliver as part of its support and maintenance services the patches and updates needed to maintain the functionality of its own software offering. As the utility of the solution to the end customer erodes very quickly without these updates, these are viewed as critical and the customized software solution and updates are not separately identifiable. As such, these arrangements are treated as a single performance obligation; revenue is deferred until completion of the customization services, and recognized ratably over the committed support and maintenance term, typically ranging from 1 year to 3 years.

Our Ticketing Products Group primarily derives revenue from ticketing services arrangements that systematically consist of a software component, support and maintenance, managed services and hosting services. The software could be hosted by third-party hosting service providers or us. All arrangements entered into subsequent to the acquisition preclude customers from taking possession of the software at any time during the hosting term and we have concluded that should a customer that was under contract as of the acquisition date ever request possession of the software, the Ticketing Products Group would have the ability to charge the customer, and enforce a claim to payment of a substantive fee in exchange for such right, and that the costs of setting up the environment needed to run the software would act as a significant disincentive to the customer taking possession of the software. Based on the above, we concluded that these services are a single performance obligation, with customers simultaneously receiving and consuming the benefits provided by the Ticketing Products Group's performance, and recognize ticketing services revenue ratably over the term, commencing upon completion of setup activities. We recognize setup fees upon completion. While these activities do not transfer a service to the customer, we elected not to defer and amortize these fees over the expected duration of the customer relationship owing to the immateriality of the amounts charged.

Significant Judgments

Historically and with the exceptions noted below, no significant judgment has generally been required in determining the amount and timing of revenue from our contracts with customers.

- For our contract and other revenue, revenue is recognized as services are performed on a percentage-of-completion basis, measured using the input method. Due to the nature of the work performed in these arrangements, the estimation of percentage-of-completion is complex and involves significant judgment. The key factor reviewed by us to estimate costs to complete each contract is the estimated man-days necessary to complete the project. If circumstances arise that change the original estimates of extent of progress toward completion, revisions to the estimates are made that may result in increases or decreases in estimated revenues or costs. Revisions are reflected in revenue on a cumulative catch-up basis in the period in which the circumstances that gave rise to the revision become known. We have adequate tools and controls in place, and substantial experience and expertise in timely and accurately tracking man-days incurred in completing customization and other professional services, and quantifying changes in estimates.

Key estimates used in recognizing revenue predominantly consist of the following:

- All fixed-fee arrangements result in cash being received after control over the underlying IP use right has transferred to the licensee, and over a period exceeding a year. As such, all these arrangements include a significant financing component. We calculate a customer-specific lending rate using a Daily Treasury Yield Curve Rate that changes depending on the date on which the licensing arrangement was entered into and the term (in years) of the arrangement, and take into consideration a licensee-specific risk profile determined based on a review of the licensee's "Full Company View" Dun & Bradstreet report obtained on the date the licensing arrangement was signed by the parties, with a risk premium being added to the Daily Treasury Yield Curve Rate considering the overall business risk, financing strength and risk indicators, as listed.

- We recognize revenue on variable fee licensing arrangements on the basis of estimates. In connection with the adoption of the New Revenue Standard, we have set up specific procedures and controls to ensure timely and accurate quantification of variable royalties, and implemented new systems to enable the preparation of the estimates and reporting of the financial information required by the New Revenue Standard.

Goodwill

Goodwill represents the excess of the purchase price over the fair value of the net tangible and identifiable intangible assets acquired in each business combination. Goodwill is not subject to amortization, but is subject to at least an annual assessment for impairment, applying a fair-value based test. We perform our impairment analysis of goodwill on an annual basis during the fourth quarter of the year unless conditions arise that warrant a more frequent evaluation.

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Goodwill is allocated to the various reporting units which are generally operating segments. The goodwill impairment test compares the fair value of each reporting unit to its carrying value. The fair values of the reporting units are estimated using an income or discounted cash flows approach. Any goodwill impairment will be the amount by which a reporting unit's carrying value exceeds its fair value, not to exceed the carrying amount of goodwill.

Under the income approach, we measure fair value of the reporting unit based on a projected cash flow method using a discount rate determined by our management which is commensurate with the risk inherent in our current business model. Our discounted cash flow projections are based on our annual financial forecasts developed internally by management for use in managing our business. If the fair value of the reporting unit exceeds its carrying value, goodwill is not impaired and no further testing is required. If the fair value of the reporting unit is less than the carrying value, then the amount of goodwill impairment will be the amount by which the reporting unit's carrying value exceeds its fair value, not to exceed the carrying amount of goodwill.

As of December 31, 2018, the fair value of the MID reporting unit, with $66.6 million of goodwill, exceeded the carrying value of its net assets by approximately 17% and the fair value of the RSD reporting unit, with $140.5 million of goodwill, exceeded the carrying value of its net assets by approximately 72%. Key assumptions used to determine the fair value of the MID and RSD reporting units at December 31, 2018, were the revenue growth rates for the forecast period and terminal year, terminal growth rates and discount rates. Certain estimates used in the income approach involve information for new product lines with limited financial history and developing revenue models which increase the risk of differences between the projected and actual performance. The discount rate of 16% for MID and 16.5% for RSD is based on the reporting units' overall risk profile relative to other guideline companies, market adoption of our technology, the reporting units' respective industry as well as the visibility of future expected cash flows. The terminal growth rate applied to determine fair value for both reporting units was 3%, which was based on historical experience as well as anticipated economic conditions, industry data and long term outlook for the business. These assumptions are inherently uncertain.

Given the current economic environment and the uncertainties regarding the impact on our business, there can be no assurance that the estimates and assumptions made for purposes of our goodwill impairment testing in the fourth quarter of 2018 will prove to be accurate predictions of the future. If our assumptions regarding forecasted revenues or operating margin rates are not achieved, we may be required to record goodwill impairment charges in future periods, whether in connection with the next annual impairment testing or prior to that if any change constitutes a triggering event outside of the period when the annual goodwill impairment test is performed. It is not possible at this time to determine if any such future impairment charge would result or, if it does, whether such charge would be material. We believe that the assumptions and rates used in our impairment test are reasonable. However, they are judgmental, and variations in any of the assumptions or rates could result in materially different calculations of impairment amounts.

Intangible Assets

Intangible assets are comprised of existing technology, customer contracts and contractual relationships, and other definite-lived and indefinite-lived intangible assets. Identifiable intangible assets resulting from the acquisitions of entities accounted for using the purchase method of accounting are estimated by management based on the fair value of assets received. Identifiable definite-lived intangible assets are being amortized over the period of estimated benefit using the straight-line method and estimated useful lives ranging from 1 to 10 years.

We amortize definite-lived assets over their estimated useful lives. We evaluate definite-lived and indefinite-lived assets for impairment whenever events or changes in circumstances indicate the carrying value of an asset may not be recoverable. The carrying value is not recoverable if it exceeds the undiscounted cash flows resulting from the use of the asset and its eventual disposition. Our estimates of future cash flows attributable to our assets require significant judgment based on our historical and anticipated results and are subject to many factors. Factors we consider important which could trigger an impairment review include significant negative industry or economic trends, significant loss of clients, and significant changes in the manner of our use of the acquired assets or the strategy for our overall business.

When we determine that the carrying value of the assets may not be recoverable based upon the existence of one or more of the above indicators of impairment, we measure the potential impairment based on a projected discounted cash flow method using a discount rate determined by our management to be commensurate with the risk inherent in our current business model. An impairment loss is recognized only if the carrying amount of the asset is not recoverable and exceeds its fair value. Different assumptions and judgments could materially affect the calculation of the fair value of our assets.

Acquired indefinite-lived intangible assets related to our in-process research and development ("IPR&D") are capitalized and subject to impairment testing until completion or abandonment of the projects. Upon successful completion of each project, we make a separate determination of useful life of the acquired indefinite-lived intangible assets and the related amortization is recorded as an expense over the estimated useful life of the specific projects. Indefinite-lived intangible assets are subject to at

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least an annual assessment for impairment, applying a fair-value based test. Under the income approach, we measure fair value of the indefinite-lived intangible assets based on a projected cash flow method using a discount rate determined by our management which is commensurate with the risk inherent in our current business model. Our discounted cash flow projections are based on our annual financial forecasts developed internally by our management for use in managing our business. If the fair value of the indefinite-lived intangible assets exceeds its carrying value, the indefinite-lived intangible assets are not impaired and no further testing is required. If the implied fair value of the indefinite-lived intangible assets is less than the carrying value, the difference is recorded as an impairment loss.

Income Taxes

As part of preparing our consolidated financial statements, we are required to calculate the income tax expense or benefit which relates to the pretax income or loss for the period. In addition, we are required to assess the realization of the deferred tax asset or liability to be included on the consolidated balance sheet as of the reporting dates.

As of December 31, 2018, our consolidated balance sheet included net deferred tax assets, before valuation allowance, of approximately $159.4 million, which consists of net operating loss carryovers, tax credit carryovers, amortization, employee stock-based compensation expenses and certain liabilities, partially reduced by deferred tax liabilities associated with the ASC 606 adoption. As of December 31, 2018, we have a valuation allowance of $173.9 million resulting in net deferred tax liabilities of $14.5 million.

We maintain liabilities for uncertain tax positions within our long-term income taxes payable accounts and as a reduction to existing deferred tax assets to the extent tax attributes are available to offset such liabilities. These liabilities involve judgment and estimation and are monitored by us based on the best information available including changes in tax regulations, the outcome of relevant court cases and other information.

The calculation of our tax liabilities involves uncertainties in the application of complex tax law and regulations in a multitude of jurisdictions. Although ASC 740 Income Taxes, provides further clarification on the accounting for uncertainty in income taxes, significant judgment is required by us. If the ultimate resolution of tax uncertainties is different from what is currently estimated, it could materially affect income tax expense.

Stock-Based Compensation

We maintained stock plans covering a broad range of potential equity grants including stock options, nonvested equity stock and equity stock units and performance based instruments. In addition, we sponsor an Employee Stock Purchase Plan (“ESPP”), whereby eligible employees are entitled to purchase Common Stock semi-annually, by means of limited payroll deductions, at a 15% discount from the fair market value of the Common Stock as of specific dates.

The accounting guidance for share-based payments requires the measurement and recognition of compensation expense in our statement of operations for all share-based payment awards made to our employees, directors and consultants including employee stock options, nonvested equity stock and equity stock units, and employee stock purchase grants. Stock-based compensation expense is measured at grant date, based on the estimated fair value of the award, reduced by an estimate of the annualized rate of expected forfeitures, and is recognized as expense over the employees’ expected requisite service period, generally using the straight-line method. In addition, the accounting guidance for share-based payments requires the benefits of tax deductions in excess of recognized compensation expense to be reported as a financing cash flow, rather than as an operating cash flow as prescribed under previous accounting rules. Our forfeiture rate represents the historical rate at which our stock-based awards were surrendered prior to vesting. The accounting guidance for share-based payments requires forfeitures to be estimated at the time of grant and revised on a cumulative basis, if necessary, in subsequent periods if actual forfeitures differ from those estimates. See Note 12, “Equity Incentive Plans and Stock-Based Compensation,” of Notes to Consolidated Financial Statements of this Form 10-K for more information regarding the valuation of stock-based compensation.

Recent Accounting Pronouncements

See Note 3, “Recent Accounting Pronouncements,” of Notes to Consolidated Financial Statements of this Form 10-K for a full description of recent accounting pronouncements including the respective expected dates of adoption.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We are exposed to financial market risks, primarily arising from the effect of interest rate fluctuations on our investment portfolio. Interest rate fluctuation may arise from changes in the market’s view of the quality of the security issuer, the overall economic outlook, and the time to maturity of our portfolio. We mitigate this risk by investing only in high quality, highly

liquid instruments. Securities with original maturities of one year or less must be rated by two of the three industry standard rating agencies as follows: A1 by Standard & Poor's, P1 by Moody's and/or F-1 by Fitch. Securities with original maturities of greater than one year must be rated by two of the following industry standard rating agencies as follows: AA- by Standard & Poor's, Aa3 by Moody's and/or AA- by Fitch. By corporate investment policy, we limit the amount of exposure to $15.0 million or 10% of the portfolio, whichever is lower, for any single non-U.S. Government issuer. A single U.S. Agency can represent up to 25% of the portfolio. No more than 20% of the total portfolio may be invested in the securities of an industry sector, with money market fund investments evaluated separately. Our policy requires that at least 10% of the portfolio be in securities with a maturity of 90 days or less. We may make investments in U.S. Treasuries, U.S. Agencies, corporate bonds and municipal bonds and notes with maturities up to 36 months. However, the bias of our investment portfolio is shorter maturities. All investments must be U.S. dollar denominated. Additionally, we have no significant exposure to European sovereign debt.

We invest our cash equivalents and marketable securities in a variety of U.S. dollar financial instruments such as U.S. Treasuries, U.S. Government Agencies, commercial paper and corporate notes. Our policy specifically prohibits trading securities for the sole purposes of realizing trading profits. However, we may liquidate a portion of our portfolio if we experience unforeseen liquidity requirements. In such a case, if the environment has been one of rising interest rates we may experience a realized loss, similarly, if the environment has been one of declining interest rates we may experience a realized gain. As of December 31, 2018, we had an investment portfolio of fixed income marketable securities of $226.7 million including cash equivalents. If market interest rates were to increase immediately and uniformly by 1.0% from the levels as of December 31, 2018, the fair value of the portfolio would decline by approximately $0.3 million. Actual results may differ materially from this sensitivity analysis.

The fair value of our convertible notes is subject to interest rate risk, market risk and other factors due to the convertible feature. The fair value of the convertible notes will generally increase as interest rates fall and decrease as interest rates rise. In addition, the fair value of the convertible notes will generally increase as our common stock price increases and will generally decrease as our common stock price declines in value. The interest and market value changes affect the fair value of our convertible notes but do not impact our financial position, cash flows or results of operations due to the fixed nature of the debt obligation.

We invoice the majority of our customers in U.S. dollars. Although the fluctuation of currency exchange rates may impact our customers, and thus indirectly impact us, we do not attempt to hedge this indirect and speculative risk. Our overseas operations consist primarily of international business operations in the Netherlands and the United Kingdom, design centers in Canada, India and Finland and small business development offices in Australia, China, Japan, Korea, Singapore and Taiwan. We monitor our foreign currency exposure; however, as of December 31, 2018, we believe our foreign currency exposure is not material enough to warrant foreign currency hedging.

## Item 8. Financial Statements and Supplementary Data

See Item 15 "Exhibits and Financial Statement Schedules" of this Form 10-K for required financial statements and supplementary data.

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

None.

## Item 9A. Controls and Procedures

### Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures designed to ensure that information required to be disclosed in the reports we file or submit pursuant to the Securities and Exchange Act of 1934 as amended ("Exchange Act") is recorded, processed, summarized and reported within the time periods specified in the rules and forms of the Securities and Exchange Commission, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure.

Management, with the participation of the Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of the design and operation of our disclosure controls and procedures as defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act as of the end of the period covered by this report. Based on this evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that, as of December 31, 2018, our disclosure controls and procedures were effective.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Our internal control over financial reporting is the process designed by, or under the supervision of, our Chief Executive Officer and Chief Financial Officer, and effected by our 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, and includes those policies and procedures that:

(i) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect our transactions and dispositions of assets;

(ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with the authorization of our management and directors; and

(iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our 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.

Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an assessment of the effectiveness of our internal control over financial reporting as of December 31, 2018. In making this assessment, our management used the criteria set forth in Internal Control — Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). Based on the results of this assessment, management has concluded that, as of December 31, 2018, our internal control over financial reporting was effective based on the criteria in Internal Control — Integrated Framework (2013) issued by the COSO.

The effectiveness of our internal control over financial reporting as of December 31, 2018 has been audited by PricewaterhouseCoopers, LLP, an independent registered public accounting firm, as stated in their report which appears herein.

Changes in Internal Control Over Financial Reporting

There was no change in internal control over financial reporting during the last fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

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# PART III

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

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2019 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K. The information under the heading "Our Executive Officers" in Part I, Item 1 of this Annual Report on Form 10-K is also incorporated herein by reference.

We have a Code of Business Conduct and Ethics for all of our directors, officers and employees. Our Code of Business Conduct and Ethics is available on our website at http://investor.rambus.com/default.aspx?SectionId=7d08773c-336a-43c5-b0ff-5b190f1901eb&LanguageId=1. To date, there have been no waivers under our Code of Business Conduct and Ethics. We will post any amendments or waivers, if and when granted, of our Code of Business Conduct and Ethics on our website.

## Item 11. Executive Compensation

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2019 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

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

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2019 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

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

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2019 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

## Item 14. Principal Accountant Fees and Services

The information responsive to this item is incorporated herein by reference to our Proxy Statement for our 2019 annual meeting of stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) (1) Financial Statements

The following consolidated financial statements of the Registrant and Report of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm, are included herewith:



(a) (2) Financial Statement Schedule

All schedules are omitted because they are not applicable or the required information is shown in the Consolidated Financial Statements or the notes thereto.

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Rambus Inc.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Rambus Inc. and its subsidiaries (the “Company”) as of December 31, 2018 and 2017, and the related consolidated statements of operations, comprehensive income (loss), stockholders’ equity and cash flows for each of the three years in the period ended December 31, 2018, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note 3 to the consolidated financial statements, the Company changed the manner in which it accounts for revenues from contracts with customers in 2018.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Report on Internal Control over Financial Reporting under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United
States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to

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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 (iii) 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/ PricewaterhouseCoopers LLP
San Jose, California
February 22, 2019

We have served as the Company's auditor since 1991.

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RAMBUS INC.
CONSOLIDATED BALANCE SHEETS

| | December 31, 2018 | 2017 |
|---|---|---|
| | (In thousands, except shares and per share amounts) | |
| ASSETS | | |
| Current assets: | | |
| Cash and cash equivalents | $115,924 | $225,844 |
| Marketable securities | 161,840 | 103,532 |
| Accounts receivable | 50,863 | 25,326 |
| Unbilled receivables | 176,613 | 566 |
| Inventories | 6,772 | 5,159 |
| Prepaids and other current assets | 15,738 | 11,317 |
| Total current assets | 527,750 | 371,744 |
| Intangible assets, net | 59,936 | 91,722 |
| Goodwill | 207,178 | 209,661 |
| Property, plant and equipment, net | 57,028 | 54,303 |
| Deferred tax assets | 4,435 | 159,099 |
| Unbilled receivables, long-term | 497,003 | — |
| Other assets | 7,825 | 4,543 |
| Total assets | $1,361,155 | $891,072 |
| LIABILITIES & STOCKHOLDERS' EQUITY | | |
| Current liabilities: | | |
| Accounts payable | $7,392 | $9,614 |
| Accrued salaries and benefits | 16,938 | 17,091 |
| Convertible notes, short-term | — | 78,451 |
| Deferred revenue | 19,374 | 18,272 |
| Income taxes payable, short-term | 16,390 | 258 |
| Other current liabilities | 9,191 | 9,156 |
| Total current liabilities | 69,285 | 132,842 |
| Convertible notes, long-term | 141,934 | 135,447 |
| Long-term imputed financing obligation | 36,297 | 37,262 |
| Long-term income taxes payable | 77,280 | 3,344 |
| Deferred tax liabilities | 18,960 | 9,830 |
| Other long-term liabilities | 5,287 | 763 |
| Total liabilities | 349,043 | 319,488 |
| Commitments and contingencies (Notes 11 and 17) | | |
| Stockholders' equity: | | |
| Convertible preferred stock, $.001 par value: | | |
| Authorized: 5,000,000 shares; Issued and outstanding: no shares at December 31, 2018 and December 31, 2017 | — | — |
| Common Stock, $.001 par value: | | |
| Authorized: 500,000,000 shares; Issued and outstanding: 109,017,708 shares at December 31, 2018 and 109,763,967 shares at December 31, 2017 | 109 | 110 |
| Additional paid in capital | 1,226,588 | 1,212,798 |
| Accumulated deficit | (204,294) | (636,227) |
| Accumulated other comprehensive loss | (10,291) | (5,097) |

| | | |
|---|---|---|
| Total stockholders' equity | 1,012,112 | 571,584 |
| Total liabilities and stockholders' equity | $1,361,155 | $891,072 |

See Notes to Consolidated Financial Statements

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RAMBUS INC.
CONSOLIDATED STATEMENTS OF OPERATIONS

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2018 | 2017 | 2016 |
| | (In thousands, except per share amounts) | | |
| Revenue: | | | |
| Royalties | $130,452 | $289,594 | $264,614 |
| Product revenue | 38,690 | 36,509 | 26,052 |
| Contract and other revenue | 62,059 | 66,993 | 45,931 |
| Total revenue | 231,201 | 393,096 | 336,597 |
| Operating costs and expenses: | | | |
| Cost of product revenue* | 18,299 | 23,783 | 21,329 |
| Cost of contract and other revenue | 35,402 | 55,364 | 45,761 |
| Research and development* | 158,339 | 149,135 | 129,844 |
| Sales, general and administrative* | 103,911 | 110,940 | 95,145 |
| Restructuring charges | 2,217 | — | — |
| Impairment of in-process research and development intangible asset | — | — | 18,300 |
| Change in contingent consideration liability | — | — | (6,845) |
| Gain from sale of intellectual property | — | (533) | — |
| Gain from settlement | — | — | (579) |
| Total operating costs and expenses | 318,168 | 338,689 | 302,955 |
| Operating income (loss) | (86,967) | 54,407 | 33,642 |
| Interest income and other income (expense), net | 32,621 | 1,384 | 1,740 |
| Loss on extinguishment of debt | — | (1,082) | — |
| Interest expense | (16,282) | (13,720) | (12,745) |
| Interest and other income (expense), net | 16,339 | (13,418) | (11,005) |
| Income (loss) before income taxes | (70,628) | 40,989 | 22,637 |
| Provision for income taxes | 87,329 | 63,851 | 15,817 |
| Net income (loss) | $(157,957) | $(22,862) | $6,820 |
| Net income (loss) per share: | | | |
| Basic | $(1.46) | $(0.21) | $0.06 |
| Diluted | $(1.46) | $(0.21) | $0.06 |
| Weighted average shares used in per share calculations: | | | |
| Basic | 108,450 | 110,198 | 110,162 |
| Diluted | 108,450 | 110,198 | 113,140 |

* Includes stock-based compensation:

| | | | |
|---|---|---|---|
| Cost of product revenue | $8 | $78 | $56 |
| Research and development | $12,582 | $12,185 | $9,165 |
| Sales, general and administrative | $9,146 | $15,140 | $11,792 |

See Notes to Consolidated Financial Statements

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CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2018 | 2017 | 2016 |
| | (In thousands) | | |
| Net income (loss) | $(157,957) | $(22,862) | $6,820 |
| Other comprehensive income (loss): | | | |
| Foreign currency translation adjustment | (4,447) | 7,798 | (13,485) |
| Unrealized gain (loss) on marketable securities, net of tax | (747) | 613 | (396) |
| Total comprehensive loss | $(163,151) | $(14,451) | $(7,061) |

See Notes to Consolidated Financial Statements

RAMBUS INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

| | Common Stock Shares | Common Stock Amount | Additional Paid-in Capital | Accumulated Deficit | Accumulated Other Comprehensive Gain (Loss) | Total |
|---|---|---|---|---|---|---|
| | (In thousands) | | | | | |
| Balances at December 31, 2015 | 109,288 | $ 109 | $ 1,130,368 | $ (604,317 ) | $ 373 | $ 526,533 |
| Net income | — | — | — | 6,820 | — | 6,820 |
| Foreign currency translation adjustment | — | — | — | — | (13,485 ) | (13,485 ) |
| Unrealized loss on marketable securities, net of tax | — | — | — | — | (396) | (396) |
| Issuance of common stock upon exercise of options, equity stock and employee stock purchase plan | 2,502 | 3 | 12,294 | — | — | 12,297 |
| Repurchase and retirement of common stock under repurchase plan | (736 ) | (1 ) | 17,555 | (17,554 ) | — | — |
| Stock-based compensation | — | — | 21,013 | — | — | 21,013 |
| Balances at December 31, 2016 | 111,054 | 111 | 1,181,230 | (615,051 ) | (13,508 ) | 552,782 |
| Net loss | — | — | — | (22,862 ) | — | (22,862 ) |
| Foreign currency translation adjustment | — | — | — | — | 7,798 | 7,798 |
| Unrealized gain on marketable securities, net of tax | — | — | — | — | 613 | 613 |
| Issuance of common stock upon exercise of options, equity stock and employee stock purchase plan | 2,727 | 3 | 10,730 | — | — | 10,733 |
| Repurchase and retirement of common stock under repurchase plan | (4,017) | (4 ) | (13,477) | (36,557 ) | — | (50,038 ) |
| Stock-based compensation | — | — | 27,403 | — | — | 27,403 |
| Equity component of 1.375% convertible notes, net | — | — | 33,913 | — | — | 33,913 |
| Purchase of convertible note hedges | — | — | (33,523 ) | — | — | (33,523 ) |
| Issuance of warrants | — | — | 23,173 | — | — | 23,173 |
| Repurchase of 1.125% convertible notes | — | — | (16,651 ) | — | — | (16,651 ) |
| Cumulative effect adjustment from adoption of ASU 2016-09 | — | — | — | 38,243 | — | 38,243 |
| Balances at December 31, 2017 | 109,764 | 110 | 1,212,798 | (636,227 ) | (5,097 ) | 571,584 |
| Net loss | — | — | — | (157,957 ) | — | (157,957 ) |
| Foreign currency translation adjustment | — | — | — | — | (4,447) | (4,447) |
| Unrealized loss on marketable securities, net of tax | — | — | — | — | (747 ) | (747 ) |
| Issuance of common stock upon exercise of options, equity stock and employee stock purchase plan | 2,616 | 3 | 4,627 | — | — | 4,630 |
| Repurchase and retirement of common stock under repurchase plan | (3,786) | (4 ) | (12,573 ) | (37,456 ) | — | (50,033 ) |
| Stock-based compensation | — | — | 21,736 | — | — | 21,736 |
| Issuance of common stock in connection with the maturity of the 2018 Notes related to the | 424 | — | — | — | — | — |

settlement of the in-the-money conversion
feature of the 2018 Notes

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| | | | | | | |
|---|---|---|---|---|---|---|
| Cumulative effect adjustment from adoption of ASU 2016-01 | — | — | — | 1,058 | — | 1,058 |
| Cumulative effect adjustment from the adoption of ASC 606 | — | — | — | 626,288 | — | 626,288 |
| Balances at December 31, 2018 | 109,018 | $109 | $1,226,588 | $(204,294) | $(10,291) | $1,012,112 |

See Notes to Consolidated Financial Statements

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RAMBUS INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2018 | 2017 | 2016 |
| | (In thousands) | | |
| Cash flows from operating activities: | | | |
| Net income (loss) | $(157,957) | $(22,862) | $6,820 |
| Adjustments to reconcile net income (loss) to net cash provided by operating activities: | | | |
| Stock-based compensation | 21,736 | 27,403 | 21,013 |
| Depreciation | 10,745 | 13,275 | 12,965 |
| Amortization of intangible assets | 29,341 | 41,962 | 37,138 |
| Non-cash interest expense and amortization of convertible debt issuance costs | 9,243 | 7,578 | 6,749 |
| Loss on extinguishment of debt | — | 1,082 | — |
| Impairment of in-process research and development intangible asset | — | — | 18,300 |
| Change in contingent consideration liability | — | — | (6,845) |
| Deferred tax (benefit) provision | 79,954 | 39,535 | (7,116) |
| Excess tax benefits from stock-based compensation | — | — | (1,196) |
| Non-cash restructuring | 670 | — | — |
| Gain from sale of assets held for sale | (1,266) | — | — |
| Gain from sale of marketable equity security | (291) | — | — |
| Loss on equity investment | 67 | — | — |
| Loss from sale of property and property, plant and equipment | 395 | 227 | — |
| Effect of exchange rate on assumed cash liability from acquisition | — | — | (1,558) |
| Change in operating assets and liabilities, net of effects of acquisitions: | | | |
| Accounts receivable | (24,933) | (1,110) | 5,797 |
| Unbilled receivables | 145,164 | — | — |
| Prepaid expenses and other assets | (4,084) | 4,354 | (6,205) |
| Inventories | (1,856) | 473 | 1,748 |
| Accounts payable | (2,268) | (651) | 2,373 |
| Accrued salaries and benefits and other accrued liabilities | (3,221) | 4,703 | (1,519) |
| Income taxes payable | (14,550) | 861 | (175) |
| Deferred revenue | 228 | 607 | 7,313 |
| Net cash provided by operating activities | 87,117 | 117,437 | 95,602 |
| Cash flows from investing activities: | | | |
| Purchases of property, plant and equipment | (10,762) | (9,385) | (8,556) |
| Acquisition of intangible assets | (350) | (120) | — |
| Purchases of marketable securities | (282,117) | (102,497) | (54,869) |
| Maturities of marketable securities | 223,079 | 32,048 | 110,081 |
| Proceeds from sale of marketable securities | — | 4,450 | 50,546 |
| Proceeds from sale of property and property, plant and equipment | 10 | 33 | 113 |
| Proceeds from sale of assets held for sale | 3,754 | — | — |
| Proceeds from sale of equity security | 1,350 | — | — |
| Investment in privately-held company | (3,000) | — | — |
| Acquisition of businesses, net of cash acquired | — | — | (202,523) |
| Net cash used in investing activities | (68,036) | (75,471) | (105,208) |
| Cash flows from financing activities: | | | |
| Proceeds from issuance of 1.375% convertible notes | — | 172,500 | — |
| Issuance costs related to issuance of 1.375% convertible notes | — | (3,277) | — |

| | | | |
|---|---|---|---|
| Payments for convertible note hedges | — | (33,523) | — |
| Proceeds from issuance of warrants | — | 23,173 | — |
| Repayment of 1.125% convertible notes | (81,207) | (72,257) | — |
| Proceeds received from issuance of common stock under employee stock plans | 11,402 | 15,826 | 15,436 |
| Principal payments against financing lease obligation | (1,080) | (860) | (661) |
| Payment of additional purchase consideration from acquisition | — | — | (10,206) |
| Repurchase and retirement of common stock, including prepayment under accelerated share repurchase program | (50,033) | (50,038) | — |
| Excess tax benefits from stock-based compensation | — | — | 1,196 |
| Payments of taxes on restricted stock units | (6,766) | (5,099) | (3,064) |
| Net cash provided by (used in) financing activities | (127,684) | 46,445 | 2,701 |
| Effect of exchange rate changes on cash and cash equivalents | (989) | 2,139 | (1,565) |
| Net increase (decrease) in cash and cash equivalents | (109,592) | 90,550 | (8,470) |
| Cash and cash equivalents at beginning of year | 225,844 | 135,294 | 143,764 |
| Cash and cash equivalents at end of year | $116,252 | $225,844 | $135,294 |
| | | | |
| Supplemental disclosure of cash flow information: | | | |
| Cash paid during the period for: | | | |
| Interest | $3,044 | $1,553 | $1,553 |
| Income taxes, net of refunds | $23,581 | $22,733 | $26,787 |
| Non-cash investing and financing activities: | | | |
| Property, plant and equipment received and accrued in accounts payable and other accrued liabilities | $8,225 | $1,092 | $576 |

See Notes to Consolidated Financial Statements

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RAMBUS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Formation and Business of the Company

Rambus Inc. (the "Company" or "Rambus") was incorporated in California in March 1990 and reincorporated in Delaware in March 1997. In addition to licensing, the Company is creating new business opportunities through offering products and services where its goal is to perpetuate strong company operating performance and long-term stockholder value. The Company generates revenue by licensing its inventions and solutions, selling its semiconductor products and providing services to market-leading companies.

Building upon the foundation of technologies for memory, SerDes and other chip interfaces, the Company has expanded its portfolio of inventions and solutions to address chip and system security, as well as device provisioning and key management. The Company intends to continue its growth in leading-edge, high-growth markets, consistent with its mission to create value through its innovations and to make those technologies available through the shipment of products, the delivery of services, and licensing business models. Key to its efforts is continuing to hire and retain world-class inventors, scientists and engineers to lead the development and deployment of inventions and technology solutions for its fields of focus.

2. Summary of Significant Accounting Policies

Financial Statement Presentation

The accompanying consolidated financial statements include the accounts of Rambus and its wholly owned subsidiaries. All intercompany accounts and transactions have been eliminated in the accompanying consolidated financial statements. Investments in entities with more than 20% ownership by Rambus and in which Rambus has the ability to significantly influence the operations of the investee (but not control) are accounted for using the equity method and are included in other assets.

Use of Estimates

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

Reclassifications

Certain prior year balances were reclassified to conform to the current year's presentation. None of these reclassifications had an impact on reported net income or cash flows for any of the periods presented.

Revenue Recognition

Overview

The Company recognizes revenue upon transfer of control of promised goods and services in an amount that reflects the consideration it expects to receive in exchange for those goods and services. Unless indicated otherwise below, all of the goods and services are distinct and are accounted for as separate performance obligations.

Where an arrangement includes multiple performance obligations, the transaction price is allocated to these on a relative standalone selling prices basis. The Company has established standalone selling prices for all of its offerings - specifically, a same pricing methodology is consistently applied to all licensing arrangements; all services offerings are priced within tightly controlled bands and all contracts that include support and maintenance state a renewal rate or price that is systematically enforced.

Rambus' revenue consists of royalty, product and contract and other revenue. Royalty revenue consists of patent and technology license royalties. Products consist of memory buffer chipsets sold directly and indirectly to module manufacturers and OEMs worldwide through multiple channels, including our direct sales force and distributors. Contract and other revenue consists of software license fees, engineering fees associated with integration of Rambus' technology solutions into its customers' products and support and maintenance fees.

Royalty Revenue

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

Rambus' patent and technology licensing arrangements generally range between 1 and 7 years in duration and generally grant the licensee the right to use the Company's entire IP portfolio as it evolves over time. These arrangements do not typically grant the licensee the right to terminate for convenience and where such rights exist, termination is prospective, with no refund of fees already paid by the licensee. There is no interdependency or interrelation between the IP included in the portfolio licensed upon contract inception and any IP subsequently made available to the licensee, and the Company would be able to fulfill its promises by transferring the portfolio and the additional IP use rights independently. However, the numbers of additions to, and removals from the portfolio (for example when a patent expires and renewal is not granted to the Company) in any given period have historically been relatively consistent; as such, the Company does not allocate the transaction price between the rights granted at contract inception and those subsequently granted over time as a function of these additions.

Patent and technology licensing arrangements result in fixed payments received over time, with guaranteed minimum payments on occasion, variable payments calculated based on the licensee's sale or use of the IP, or a mix of fixed and variable payments.

For fixed-fee arrangements (including arrangements that include minimum guaranteed amounts), variable royalty arrangements that the Company has concluded are fixed in substance and the fixed portion of hybrid fixed/variable arrangements, the Company recognizes revenue upon control over the underlying IP use right transferring to the licensee, net of the effect of significant financing components calculated using customer-specific, risk-adjusted lending rates ranging between 3% and 6%, with the related interest income being recognized over time on an effective rate basis. Where a licensee has the contractual right to terminate a fixed-fee arrangement for convenience without any substantive penalty payable upon such termination, the Company applies the guidance in the New Revenue Standard to the duration of the contract in which the parties have present enforceable rights and obligations and only recognizes revenue for amounts that are due and payable.

For variable arrangements, the Company recognizes revenue based on an estimate of the licensee's sale or usage of the IP during the period of reference, typically quarterly, with a true-up being recorded when the Company receives the actual royalty report from the licensee.

Product Revenue

Product revenue is recognized upon shipment of product to customers, net of accruals for estimated sales returns and allowances, and to distributors, net of accruals for price protection and rights of return on products unsold by the distributors. To date, none of these accruals have been significant. The Company transacts with direct customers primarily pursuant to standard purchase orders for delivery of products and generally allows customers to cancel or change purchase orders within limited notice periods prior to the scheduled shipment date.

Contract and Other Revenue

Contract and other revenue consists of software license fees and engineering fees associated with integration of Rambus' technology solutions into its customers' solutions (or products) and related support and maintenance.

An initial software arrangement generally consists of a term-based or perpetual license, significant software customization services and support and maintenance services that include post-implementation customer support and the right to unspecified software updates and enhancements on a when and if available basis. The Company recognizes the license and customization services revenue based on man-days incurred during the reporting period as compared to the estimated total man-days necessary for each contract, and the support and maintenance revenue ratably over the term. The Company recognizes license renewal revenue at the beginning of the renewal period. The Company recognizes revenue from professional services purchased in addition to an initial software arrangement on a cumulative catch-up basis if these services are not distinct from the services provided as part of the initial software arrangement, or as a separate contract if these services are distinct.

During the first quarter of 2016, the Company acquired Smart Card Software Ltd., which included Bell Identification Ltd. (Payment Product Group) and Ecebs Ltd. (Ticketing Products Group), which transact mostly in software and

Software-as-a-Service arrangements, respectively.

The Company's Payment Product Group derives a significant portion of its revenue from heavily customized software in the mobile market, whereby the Payment Product Group’s software solution interacts with third-party solutions and other payment platforms to provide the functionality the customer requires. Historically, these third-party solutions have evolved at a rapid pace, with the Payment Product Group being required to deliver as part of its support and maintenance services the patches and updates needed to maintain the functionality of its own software offering. As the utility of the solution to the end customer

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

erodes very quickly without these updates, these are viewed as critical and the customized software solution and updates are not separately identifiable. As such, these arrangements are treated as a single performance obligation; revenue is deferred until completion of the customization services, and recognized ratably over the committed support and maintenance term, typically ranging from 1 year to 3 years.
The Company's Ticketing Products Group primarily derives revenue from ticketing services arrangements that systematically consist of a software component, support and maintenance, managed services and hosting services. The software could be hosted by third-party hosting service providers or the Company. All arrangements entered into subsequent to the acquisition preclude customers from taking possession of the software at any time during the hosting term and the Company has concluded that should a customer that was under contract as of the acquisition date ever request possession of the software, the Ticketing Products Group would have the ability to charge the customer, and enforce a claim to payment of a substantive fee in exchange for such right, and that the costs of setting up the environment needed to run the software would act as a significant disincentive to the customer taking possession of the software. Based on the above, the Company concluded that these services are a single performance obligation, with customers simultaneously receiving and consuming the benefits provided by the Ticketing Products Group’s performance, and recognize ticketing services revenue ratably over the term, commencing upon completion of setup activities. The Company recognizes setup fees upon completion. While these activities do not transfer a service to the customer, the Company elected not to defer and amortize these fees over the expected duration of the customer relationship owing to the immateriality of the amounts charged.

Significant Judgments

Historically and with the exceptions noted below, no significant judgment has generally been required in determining the amount and timing of revenue from the Company's contracts with customers.

- For the Company's contract and other revenue, revenue is recognized as services are performed on a percentage-of-completion basis, measured using the input method. Due to the nature of the work performed in these arrangements, the estimation of percentage-of-completion is complex and involves significant judgment. The key factor reviewed by the Company to estimate costs to complete each contract is the estimated man-days necessary to complete the project. If circumstances arise that change the original estimates of extent of progress toward completion, revisions to the estimates are made that may result in increases or decreases in estimated revenues or costs. Revisions are reflected in revenue on a cumulative catch-up basis in the period in which the circumstances that gave rise to the revision become known. The Company has adequate tools and controls in place, and substantial experience and expertise in timely and accurately tracking man-days incurred in completing customization and other professional services, and quantifying changes in estimates.

Key estimates used in recognizing revenue predominantly consist of the following:

- All fixed-fee arrangements result in cash being received after control over the underlying IP use right has transferred to the licensee, and over a period exceeding a year. As such, all these arrangements include a significant financing component. The Company calculates a customer-specific lending rate using a Daily Treasury Yield Curve Rate that changes depending on the date on which the licensing arrangement was entered into and the term (in years) of the arrangement, and takes into consideration a licensee-specific risk profile determined based on a review of the licensee’s “Full Company View” Dun & Bradstreet report obtained on the date the licensing arrangement was signed by the parties, with a risk premium being added to the Daily Treasury Yield Curve Rate considering the overall business risk, financing strength and risk indicators, as listed.

- The Company recognizes revenue on variable fee licensing arrangements on the basis of estimates. In connection with the adoption of the New Revenue Standard, the Company has set up specific procedures and controls to ensure timely and accurate quantification of variable royalties, and implemented new systems to enable the preparation of the estimates and reporting of the financial information required by the New Revenue Standard.

Contract Balances

Timing of revenue recognition may differ from the timing of invoicing to the Company's customers. The Company records contract assets when revenue is recognized prior to invoicing, and a contract liability when revenue is recognized subsequent to invoicing.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

The contract assets are primarily related to the Company's fixed fee IP licensing arrangements and rights to consideration for performance obligations delivered but not billed as of December 31, 2018. The contract assets are transferred to receivables when the billing occurs.
The Company's contract balances were as follows:

| (In thousands) | As of December 31, 2018 | January 1, 2018 |
|---|---|---|
| Unbilled receivables | $673,616 | $818,371 |
| Deferred revenue | 19,566 | 20,737 |

During the year ended December 31, 2018, the Company recognized $20.5 million of revenue that was included in the deferred revenue balance, as adjusted for ASC 606, as of January 1, 2018.
Revenue allocated to remaining performance obligations represents the transaction price allocated to the performance obligations that are unsatisfied, or partially unsatisfied, which includes unearned revenue and amounts that will be invoiced and recognized as revenue in future periods. Contracted but unsatisfied performance obligations were approximately $34.0 million as of December 31, 2018, which the Company primarily expects to recognize over the next 2 years.

Cost of Revenue

Cost of revenue includes cost of professional services, materials, including cost of wafers processed by third-party foundries, cost associated with packaging and assembly, test and shipping, cost of personnel, including stock-based compensation, and equipment associated with manufacturing support, logistics and quality assurance, warranty cost, amortization of developed technology, amortization of step-up values of inventory from acquisitions, write down of inventories, amortization of production mask costs, overhead and an allocated portion of occupancy costs.

Goodwill

Goodwill represents the excess of the purchase price over the fair value of the net tangible and identifiable intangible assets acquired in each business combination. Goodwill is not subject to amortization, but is subject to at least an annual assessment for impairment, applying a fair-value based test. The Company performs its impairment analysis of goodwill on an annual basis during the fourth quarter of the year unless conditions arise that warrant a more frequent evaluation.
Goodwill is allocated to the various reporting units which are generally operating segments. The goodwill impairment test compares the fair value of each reporting unit to its carrying value. The fair values of the reporting units are estimated using an income or discounted cash flows approach. Any goodwill impairment will be the amount by which a reporting unit's carrying value exceeds its fair value, not to exceed the carrying amount of goodwill.
Under the income approach, the Company measures fair value of the reporting unit based on a projected cash flow method using a discount rate determined by its management which is commensurate with the risk inherent in its current business model. The Company's discounted cash flow projections are based on its annual financial forecasts developed internally by management for use in managing its business. If the fair value of the reporting unit exceeds its carrying value, goodwill is not impaired and no further testing is required. If the fair value of the reporting unit is less than the carrying value, then the amount of goodwill impairment will be the amount by which the reporting unit's carrying value exceeds its fair value, not to exceed the carrying amount of goodwill.
The Company performed its annual goodwill impairment analysis as of December 31, 2018 and determined that the fair value of the reporting units with goodwill exceeded their carrying values.

Intangible Assets

Intangible assets are comprised of existing technology, customer contracts and contractual relationships, and other definite-lived and indefinite-lived intangible assets. Identifiable intangible assets resulting from the acquisitions of entities accounted for using the purchase method of accounting are estimated by management based on the fair value of assets received. Identifiable definite-lived intangible assets are being amortized over the period of estimated benefit using the straight-line method and estimated useful lives ranging from 1 to 10 years.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

Acquired indefinite-lived intangible assets related to the Company's in-process research and development ("IPR&D") are capitalized and subject to impairment testing until completion or abandonment of the projects. Upon successful completion of each project, the Company makes a separate determination of the useful life of the acquired indefinite-lived intangible assets and the related amortization is recorded as an expense over the estimated useful life of the specific projects. Indefinite-lived intangible assets are subject to at least an annual assessment for impairment, applying a fair-value based test. Under the income approach, the Company measures fair value of the indefinite-lived intangible assets based on a projected cash flow method using a discount rate determined by its management which is commensurate with the risk inherent in its current business model. The Company’s discounted cash flow projections are based on its annual financial forecasts developed internally by management for use in managing its business. If the fair value of the indefinite-lived intangible assets exceeds its carrying value, the indefinite-lived intangible assets are not impaired and no further testing is required. If the implied fair value of the indefinite-lived intangible assets is less than the carrying value, the difference is recorded as an impairment loss.

Inventories

Inventories are stated at the lower of cost or net realizable value. Cost is computed using standard cost, which approximates actual cost, on a first-in, first-out basis. Inventories are reduced for write downs based on periodic reviews for evidence of slow-moving or obsolete parts. The write-down is based on comparison between inventory on hand and estimated future sales for each specific product. Once written down, inventory write downs are not reversed until the inventory is sold or scrapped. Inventory write downs are also established when conditions indicate that the net realizable value is less than cost due to physical deterioration, obsolescence, changes in price level or other causes.

Property, Plant and Equipment

Property, plant and equipment include computer equipment, computer software, machinery, leasehold improvements, furniture and fixtures and buildings. Computer equipment, computer software, machinery, and furniture and fixtures are stated at cost and generally depreciated on a straight-line basis over an estimated useful life of 3, 3 to 5, 2 or 7, and 3 years, respectively. In past years, the Company undertook a series of structural improvements to ready the Sunnyvale and Brecksville facilities for its use. The Company concluded that its requirement to fund construction costs and responsibility for cost overruns resulted in the Company being considered the owner of the buildings during the construction period for accounting purposes. Upon completion of construction, the Company concluded that it retained sufficient continuing involvement to preclude de-recognition of the buildings under the FASB's authoritative guidance applicable to sale leaseback for real estate. As such, the Company continues to account for the buildings as owned real estate and to record an imputed financing obligation for its obligation to the legal owners. The buildings are being depreciated on a straight-line basis over an estimated useful life of approximately 39 years. See Note 9, “Balance Sheet Details,” and Note 11, “Commitments and Contingencies,” for additional details. Leasehold improvements are amortized on a straight-line basis over the shorter of their estimated useful lives or the initial terms of the leases. Upon disposal, assets and related accumulated depreciation are removed from the accounts and the related gain or loss is included in the results from operations.

Definite-Lived and Indefinite-Lived Asset Impairment

The Company evaluates definite-lived and indefinite-lived assets (including property, plant and equipment and intangible assets) for impairment whenever events or changes in circumstances indicate the carrying value of an asset group may not be recoverable. The carrying value is not recoverable if it exceeds the undiscounted cash flows resulting from the use of the asset group and its eventual disposition. The Company’s estimates of future cash flows attributable to its asset groups require significant judgment based on its historical and anticipated results and are subject to many factors. Factors that the Company considers important which could trigger an impairment review include significant negative industry or economic trends, significant loss of clients, and significant changes in the manner of its use of the acquired assets or the strategy for its overall business.

When the Company determines that the carrying value of the asset groups may not be recoverable based upon the existence of one or more of the above indicators of impairment, the Company measures the potential impairment based on a projected discounted cash flow method using a discount rate determined by the Company to be commensurate with the risk inherent in the Company's current business model. An impairment loss is recognized only if the carrying amount of the asset group is not recoverable and exceeds its fair value. The impairment charge is recorded to reduce the pre-impairment carrying amount of the assets based on the relative carrying amount of those assets, though not to reduce the carrying amount of an asset below its fair value. Different assumptions and judgments could materially affect the calculation of the fair value of the assets. During 2018 and 2017, the Company did not recognize any impairment of its definite-lived and indefinite-lived assets. During 2016, the Company recognized an impairment of its IPR&D intangible asset of $18.3 million.

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Income Taxes

Income taxes are accounted for using an asset and liability approach, which requires the recognition of deferred tax assets and liabilities for expected future tax events that have been recognized differently in Rambus' consolidated financial statements and tax returns. The measurement of current and deferred tax assets and liabilities is based on provisions of the enacted tax law and the effects of future changes in tax laws or rates are not anticipated. A valuation allowance is established when necessary to reduce deferred tax assets to amounts expected to be realized based on available evidence.

In addition, the calculation of the Company's tax liabilities involves dealing with uncertainties in the application of complex tax regulations. As a result, the Company reports a liability for unrecognized tax benefits resulting from uncertain tax positions taken or expected to be taken in its tax return. The Company considers many factors when evaluating and estimating its tax positions and tax benefits, which may require periodic adjustments and which may not accurately anticipate actual outcomes.

Stock-Based Compensation and Equity Incentive Plans

The Company maintained stock plans covering a broad range of equity grants including stock options, nonvested equity stock and equity stock units and performance based instruments. In addition, the Company sponsors an Employee Stock Purchase Plan (“ESPP”), whereby eligible employees are entitled to purchase Common Stock semi-annually, by means of limited payroll deductions, at a 15% discount from the fair market value of the Common Stock as of specific dates.

The Company determines compensation expense associated with restricted stock units based on the fair value of its common stock on the date of grant. The Company determines compensation expense associated with stock options based on the estimated grant date fair value method using the Black-Scholes Merton valuation model. The Company generally recognizes compensation expense using a straight-line amortization method over the respective vesting period for awards that are ultimately expected to vest. Stock-based compensation expense for 2018, 2017 and 2016 has been reduced for estimated forfeitures. When estimating forfeitures, the Company considers voluntary termination behaviors as well as trends of actual option forfeitures.

Cash and Cash Equivalents

Cash equivalents are highly liquid investments with original maturity of three months or less at the date of purchase. The Company maintains its cash balances with high quality financial institutions. Cash equivalents are invested in highly-rated and highly-liquid money market securities and certain U.S. government sponsored obligations.

Marketable Securities

Available-for-sale securities are carried at fair value, based on quoted market prices, with the unrealized gains or losses reported, net of tax, in stockholders’ equity as part of accumulated other comprehensive income (loss). The amortized cost of debt securities is adjusted for amortization of premiums and accretion of discounts to maturity, both of which are included in interest and other income, net. Realized gains and losses are recorded on the specific identification method and are included in interest and other income, net. The Company reviews its investments in marketable securities for possible other than temporary impairments on a regular basis. If any loss on investment is believed to be a credit loss, a charge will be recognized in operations. In evaluating whether a credit loss on a debt security has occurred, the Company considers the following factors: 1) the Company’s intent to sell the security, 2) if the Company intends to hold the security, whether or not it is more likely than not that the Company will be required to sell the security before recovery of the security’s amortized cost basis and 3) even if the Company intends to hold the security, whether or not the Company expects the security to recover the entire amortized cost basis. Due to the high credit quality and short term nature of the Company’s investments, there have been no material credit losses recorded to date. The classification of funds between short-term and long-term is based on whether the securities are

available for use in operations or other purposes.
Fair Value of Financial Instruments
The carrying value of cash equivalents, accounts receivable and accounts payable approximate their fair values due to their relatively short maturities as of December 31, 2018 and 2017. Marketable securities are comprised of available-for-sale securities that are reported at fair value with the related unrealized gains and losses included in accumulated other comprehensive income (loss), a component of stockholders’ equity, net of tax. Fair value of the marketable securities is determined based on quoted market prices. The fair value of the Company's convertible notes fluctuates with interest rates and with the market price of the common stock, but does not affect the carrying value of the debt on the balance sheet.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

Research and Development

Costs incurred in research and development, which include engineering expenses, such as salaries and related benefits, stock-based compensation, depreciation, professional services and overhead expenses related to the general development of Rambus' products, are expensed as incurred. Software development costs are capitalized beginning when a product's technological feasibility has been established and ending when a product is available for general release to customers. Rambus has not capitalized any software development costs since the period between establishing technological feasibility and general customer release is relatively short and as such, these costs have not been material.

Computation of Earnings (Loss) Per Share

Basic earnings (loss) per share is calculated by dividing the net income (loss) by the weighted average number of common shares outstanding during the period. Diluted earnings (loss) per share is calculated by dividing the earnings (loss) by the weighted average number of common shares and potentially dilutive securities outstanding during the period. Potentially dilutive common shares consist of incremental common shares issuable upon exercise of stock options, employee stock purchases, restricted stock and restricted stock units, and shares issuable upon the conversion of convertible notes. The dilutive effect of outstanding shares is reflected in diluted earnings per share by application of the treasury stock method. This method includes consideration of the amounts to be paid by the employees, the amount of excess tax benefits that would be recognized in equity if the instrument was exercised and the amount of unrecognized stock-based compensation related to future services. No potential dilutive common shares are included in the computation of any diluted per share amount when a net loss is reported.

Comprehensive Income (Loss)

Comprehensive income (loss) is defined as the change in equity of a business enterprise during a period from transactions and other events and circumstances from non-owner sources, including foreign currency translation adjustments and unrealized gains and losses on marketable securities. Other comprehensive income (loss), net of tax, is presented in the consolidated statements of comprehensive income (loss).

Credit Concentration

As of December 31, 2018 and 2017, the Company's cash, cash equivalents and marketable securities were invested with various financial institutions in the form of corporate notes, bonds and commercial paper, money market funds, U.S. Treasuries, U.S. Government Agencies, and municipal bonds and notes. The Company's exposure to market risk for changes in interest rates relates primarily to its investment portfolio. The Company places its investments with high credit issuers and, by investment policy, attempts to limit the amount of credit exposure to any one issuer. As stated in the Company's investment policy, it will ensure the safety and preservation of the Company's invested funds by limiting default risk and market risk. The Company has no investments denominated in foreign country currencies and therefore is not subject to foreign exchange risk from these assets.

The Company mitigates default risk by investing in high credit quality securities and by positioning its portfolio to respond appropriately to a significant reduction in a credit rating of any investment issuer or guarantor. The portfolio includes only marketable securities with active secondary or resale markets to enable portfolio liquidity.

The Company's note hedge transactions, entered into in connection with the 1.375% convertible senior notes due 2023 (the "2023 Notes"), expose the Company to credit risk to the extent that its counterparties may be unable to meet the terms of the transactions. The Company mitigates this risk by limiting its counterparties to major financial institutions. See Note 10, "Convertible Notes" for further details.

The Company's accounts receivable are derived from revenue earned from customers located in the U.S. and internationally. See Note 6, "Segments and Major Customers" for further details.

Foreign Currency Translation and Re-measurement

The Company translates the assets and liabilities of its non-U.S. dollar functional currency subsidiaries into U.S. dollars using exchange rates in effect at the end of each period. Revenue and expenses for these subsidiaries are translated using rates that approximate those in effect during the period. Gains and losses from these translations are recognized in foreign currency translation included in Accumulated Other Comprehensive Gain (Loss) in the consolidated statements of stockholders' equity. The Company's subsidiaries that use the U.S. dollar as their functional currency re-measure monetary assets and liabilities at exchange rates in effect at the end of each period, and inventories, property and non-monetary assets and liabilities at historical

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rates. Additionally, foreign currency transaction gains and losses are included in interest income and other (income) expense, net, in the consolidated statements of operations and were not material in the periods presented.

Business Combinations

The Company accounts for acquisitions of businesses using the purchase method of accounting, which requires the Company to recognize separately from goodwill the assets acquired and the liabilities assumed at their acquisition date fair values. While the Company uses its best estimates and assumptions to accurately value assets acquired and liabilities assumed at the acquisition date as well as contingent consideration, where applicable, the estimates are inherently uncertain and subject to refinement. As a result, during the measurement period, which may be up to one year from the acquisition date, the Company may record adjustments to the assets acquired and liabilities assumed with the corresponding offset to goodwill. Upon the conclusion of the measurement period or final determination of the values of assets acquired or liabilities assumed, whichever comes first, any subsequent adjustments are recorded to the consolidated statements of operations.

Accounting for business combinations requires management to make significant estimates and assumptions, especially at the acquisition date including the Company’s estimates for intangible assets, contractual obligations assumed and pre-acquisition contingencies where applicable. Although, the Company believes the assumptions and estimates made in the past have been reasonable and appropriate, they are based in part on historical experience and information obtained from the management of the acquired companies and are inherently uncertain. Critical estimates in valuing certain of the intangible assets the Company acquired include future expected cash flows from product sales, customer contracts and acquired technologies, expected costs to develop IPR&D into commercially viable products and estimated cash flows from the projects when completed and discount rates. Unanticipated events and circumstances may occur that may affect the accuracy or validity of such assumptions, estimates or actual results.

Litigation

Rambus may be involved in certain legal proceedings. Based upon consultation with outside counsel handling its defense in these matters and an analysis of potential results, if Rambus believes that a loss arising from such matters is probable and can be reasonably estimated, Rambus records the estimated liability in its consolidated financial statements. If only a range of estimated losses can be determined, Rambus records an amount within the range that, in its judgment, reflects the most likely outcome; if none of the estimates within that range is a better estimate than any other amount, Rambus records the low end of the range. Any such accrual would be charged to expense in the appropriate period. Rambus recognizes litigation expenses in the period in which the litigation services were provided.

3. Recent Accounting Pronouncements

Recent Accounting Pronouncements Adopted

In February 2018, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) No. 2018-02, "Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income". The amendments in this ASU allow entities to reclassify from AOCI to retained earnings "stranded" tax effects resulting from passage of the Tax Cuts and Jobs Act ("the Tax Act") on December 22, 2017. An entity that elects to reclassify these amounts must reclassify stranded tax effects related to the change in federal tax rate for all items accounted for in other comprehensive income (e.g., employee benefits, cumulative translation adjustments). Entities may also elect to reclassify other stranded tax effects that relate to the Tax Act but do not directly relate to the change in the federal tax rate (e.g., state taxes). However, because the amendments only relate to the reclassification of the income tax effects of the Tax Act, the underlying guidance requiring the effect of a change in tax laws or rates to be included in income from operations is not affected. Upon adoption of this ASU, entities are required to disclose their policy for releasing the income tax effects from AOCI. ASU 2018-02 is effective for annual periods beginning after December 15, 2018, and interim periods within those fiscal years. Early adoption is permitted. The amendments in this ASU may be applied retrospectively to each period in which the effect of the Tax Act is recognized or an entity may elect to apply the amendments in the period of adoption. The Company early adopted this ASU in the first quarter of 2018. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements.

In May 2017, the FASB issued ASU No. 2017-09, "Compensation—Stock Compensation (Topic 718): Scope of Modification Accounting," which amends the scope of modification accounting for share-based payment arrangements. Specifically, an entity would not apply modification accounting if the fair value, vesting conditions, and classification of the awards are the same immediately before and after the modification. This ASU is effective for interim and annual reporting periods beginning after December 15, 2017. The Company adopted this ASU on January 1, 2018. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-04, "Intangibles-Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment," which removes Step 2 of the goodwill impairment test. A goodwill impairment will now be the amount by which a reporting unit’s carrying value exceeds its fair value, not to exceed the carrying amount of goodwill. This ASU is effective for interim and annual reporting periods beginning after December 15, 2019. Early adoption is permitted, including adoption in an interim period. The Company adopted this ASU on December 31, 2018. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-01, "Business Combinations (Topic 805): Clarifying the Definition of a Business." The amendment seeks to clarify the definition of a business with the objective of adding guidance to assist entities with evaluating whether transactions should be accounted for as acquisitions (or disposals) of assets or businesses. The definition of a business affects many areas of accounting including acquisitions, disposals, goodwill and consolidation. This ASU is effective for interim and annual reporting periods beginning after December 15, 2017, including interim periods within those periods. The amendments should be applied prospectively on or after the effective dates. The Company adopted this ASU on January 1, 2018. The adoption of this ASU did not have a material impact on the Company's consolidated financial statements.

In January 2016, the FASB issued ASU No. 2016-01, which amends certain aspects of the recognition, measurement, presentation and disclosure of certain financial instruments, including equity investments and liabilities measured at fair value under the fair value option. The main provisions include a requirement that all investments in equity securities be measured at fair value through earnings, with certain exceptions, and a requirement to present separately in other comprehensive income the portion of the total change in fair value attributable to an entity’s own credit risk for financial liabilities where the fair value option has been elected. The Company adopted this ASU on January 1, 2018. Upon adoption, the Company reclassified approximately $1.1 million of unrealized gain related to its equity investment security classified as available-for-sale from accumulated other comprehensive income (AOCI) to retained earnings as a cumulative-effect adjustment, and began recording changes in fair value through earnings.

ASU No. 2014-09, Revenue from Contracts with Customers

In May 2014, the FASB issued ASU No. 2014-09, Revenue from Contracts with Customers in Accounting Standards Codification (ASC) Topic 606 ("ASC 606" or "the New Revenue Standard"), which superseded the revenue recognition requirements in ASC Topic 605, Revenue Recognition (“ASC 605”). The New Revenue Standard sets forth a single, comprehensive revenue recognition model for all contracts with customers to improve comparability. The New Revenue Standard requires revenue recognition to depict the transfer of goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. The New Revenue Standard can be applied either retrospectively to each prior reporting period presented (i.e., full retrospective adoption) or with the cumulative effect of initially applying the update recognized at the date of the initial application (i.e., modified retrospective adoption) along with additional disclosures.

The Company adopted the New Revenue Standard on January 1, 2018 and all the related amendments using the modified retrospective method. The Company had previously planned on adopting the New Revenue Standard using the full retrospective method, but ultimately determined to adopt the modified retrospective method. The Company recognized the cumulative effect of initially applying the new revenue standard as an adjustment to the opening balance of accumulated deficit as of January 1, 2018. The comparative information for prior periods has not been recasted and continues to be reported under the accounting standards in effect for those periods. The Company recognized unbilled receivables (contract assets) of $818 million predominantly due to how revenue is recognized for the Company's fixed-fee licensing arrangements (as noted in the first bullet point below), deferred revenue (contract liabilities) of $2 million, withholding tax liabilities of $105 million (and a corresponding deferred tax asset of $105 million, with an offsetting $16 million valuation allowance), and $174 million deferred tax liability. In the aggregate, these adjustments resulted in a $626 million net credit to accumulated deficit.

The most significant impacts of the New Revenue Standard relate to the following:

- Revenue recognized for certain patent and technology licensing arrangements has changed under the New Revenue Standard. Revenue for (i) fixed-fee arrangements (including arrangements that include minimum guaranteed amounts), (ii) variable royalty arrangements that the Company has concluded are fixed in substance and (iii) the fixed portion of hybrid fixed/variable arrangements is recognized upon control over the underlying IP use right transferring to the licensee rather than upon billing under ASC 605, net of the effect of significant financing components calculated using customer-specific, risk-adjusted lending rates and recognized over time on an effective rate basis. As a consequence of

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the acceleration of revenue recognition and for matching purposes, all withholding taxes to be paid over the term of these licensing arrangements were expensed on the date the licensing revenue was recognized.

- Adoption of the New Revenue Standard resulted in revenue recognition being accelerated for variable royalties and the variable portion of hybrid fixed/variable patent and technology licensing arrangements. Under the New Revenue Standard, royalty revenue is being recognized on the basis of management's estimates of sales or usage, as applicable, of the licensed IP in the period of reference, with a true-up being recorded in subsequent periods based on actual sales or usage as reported by licensees (rather than upon receiving royalty reports from licensees as was the case under ASC 605).

- Adoption of the New Revenue Standard also resulted in revenue recognition being accelerated for certain professional services arrangements, including arrangements consisting of significant software customization or modification and development arrangements. Under the New Revenue Standard, such arrangements are accounted for based on man-days incurred during the reporting period as compared to estimated total man-days necessary for contract completion, as the customer either controls the asset as it is created or enhanced by us or, where the asset has no alternative use to us, we are entitled to payment for performance to date and expect to fulfill the contract - revenue recognition is no longer capped to the lesser of inputs in the period or accepted billable project milestones as was the case under ASC 605.

As part of the adoption of the New Revenue Standard, the Company elected to apply the following practical expedients:

- The Company applied the practical expedient whereby the Company primarily charges commission costs to expense when incurred because the amortization period would be one year or less for the asset that would have been recognized from deferring these costs.

- The Company applied the practical expedient which allowed the Company to reflect the aggregate effect of all contract modifications occurring before the beginning of the earliest period presented when allocating the transaction price to performance obligations.

- The Company applied the practical expedient to not assess a contract asset or contract liability for a significant financing component if the period between the customer's payment and the Company's transfer of goods or services is one year or less.

Adoption of the New Revenue Standard had no impact to cash provided by (used in) operating, financing, or investing activities on the Company's Consolidated Statements of Cash Flows.

In accordance with the New Revenue Standard requirements, the disclosure of the impact of adoption on the Company's Consolidated Statement of Operations and Balance Sheet was as follows (in thousands):

| | Year Ended December 31, 2018 | | |
|---|---|---|---|
| (In thousands) | As Reported | Effect of Change Higher/ (Lower) | Amounts under ASC 605 |
| Consolidated Statement of Operations | | | |
| Revenue: | | | |
| Royalties | $130,452 | $172,769 | $303,221 |
| Product revenue | 38,690 | 707 | 39,397 |
| Contract and other revenue | 62,059 | (3,576) | 58,483 |
| Total revenue | $231,201 | $169,900 | $401,101 |
| Costs and expenses: | | | |
| Interest income and other income (expense), net | $16,339 | $(27,235) | $(10,896) |

| | | | |
|---|---|---|---|
| Provision for income taxes | $87,329 | $— | $87,329 |
| Net loss | $(157,957) | $142,665 | $(15,292) |

| (In thousands) | December 31, 2018<br>As Reported | Effect of Change Higher/ (Lower) | Amounts under ASC 605 |
|---|---|---|---|
| Consolidated Balance Sheet | | | |
| Assets: | | | |
| Unbilled receivables | $673,616 | $(673,616) | $ — |
| Liabilities: | | | |
| Deferred revenue | 19,566 | (1,243 ) | 18,323 |
| Deferred tax liabilities (included in other long-term liabilities) | 18,960 | (2,079 ) | 16,881 |
| Income taxes payable | 93,670 | (90,400 ) | 3,270 |
| Stockholders' equity: | | | |
| Accumulated deficit | (204,294 ) | (483,623 ) | (687,917 ) |

Recent Accounting Pronouncements Not Yet Adopted

In August 2018, the FASB issued ASU 2018-13, "Fair Value Measurement (Topic 820): Disclosure Framework-Changes to the Disclosure Requirements for Fair Value Measurement." The amendments in this ASU remove certain disclosures, modify certain disclosures and add additional disclosures. This ASU is effective for interim and annual reporting periods beginning after December 15, 2019. Early adoption is permitted. Certain disclosures in ASU 2018-13 would need to be applied on a retrospective basis and others on a prospective basis. The Company is currently evaluating the impact that this guidance will have on its consolidated financial statements.

In June 2018, the FASB issued ASU 2018-07, "Compensation - Stock Compensation (Topic 718)," to expand the scope of Topic 718 to include share-based payment transactions for acquiring goods and services from nonemployees. This ASU is effective for interim and annual reporting periods beginning after December 15, 2018. Early adoption is permitted, including adoption in an interim period. The Company is currently evaluating the impact that this guidance will have on its consolidated financial statements.

In July 2017, the FASB issued ASU No. 2017-11, "Earnings Per Share (Topic 260), Distinguishing Liabilities from Equity (Topic 480), Derivatives and Hedging (Topic 815)." The amendments in Part I of this ASU change the classification analysis of certain equity-linked financial instruments (or embedded features) with down round features. When determining whether certain financial instruments should be classified as liabilities or equity instruments, a down round feature no longer precludes equity classification when assessing whether the instrument is indexed to an entity's own stock. The amendments also clarify existing disclosure requirements for equity-classified instruments. As a result, a freestanding equity-linked financial instrument (or embedded conversion option) no longer would be accounted for as a derivative liability at fair value as a result of the existence of a down round feature. For freestanding equity classified financial instruments, the amendments require entities that present earnings per share (EPS) in accordance with Topic 260 to recognize the effect of the down round feature when it is triggered. That effect is treated as a dividend and as a reduction of income available to common stockholders in basic EPS. Convertible instruments with embedded conversion options that have down round features are now subject to the specialized guidance for contingent beneficial conversion features (in Subtopic 470-20, Debt-Debt with Conversion and Other Options), including related EPS guidance (in Topic 260). The amendments in Part II of this ASU recharacterize the indefinite deferral of certain provisions of Topic 480 that now are presented as pending content in the FASB codification, to a scope exception. Those amendments do not have an accounting effect. This ASU is effective for interim and annual reporting periods beginning after December 15, 2018. Early adoption is permitted, including adoption in an interim period. The Company is currently evaluating the impact that this guidance will have on its consolidated financial statements.

In March 2017, the FASB issued ASU No. 2017-08, "Receivables - Nonrefundable Fees and Other Costs (Topic 310): Premium Amortization on Purchased Callable Debt Securities," which amends the amortization period for certain purchased callable debt securities held at a premium. This ASU will shorten the amortization period for the premium to be amortized to the earliest call date. This ASU does not apply to securities held at a discount, which will continue to be amortized to maturity. This ASU is effective for interim and annual reporting periods beginning after December 15, 2018. Early adoption is permitted, including adoption in an interim period. The Company is currently evaluating the impact that this guidance will have on its consolidated financial statements.

In June 2016, the FASB issued ASU No. 2016-13. The purpose of this ASU is to require a financial asset measured at amortized cost basis to be presented at the net amount expected to be collected. Credit losses relating to available-for-sale debt securities should be recorded through an allowance for credit losses. This ASU is effective for interim and annual reporting periods beginning after December 15, 2019. The Company is currently evaluating the impact that this guidance will have on its financial condition and results of operations.

In February 2016, the FASB issued ASU No. 2016-02, "Leases." This ASU requires lessees to recognize right-of-use assets and liabilities for operating leases, initially measured at the present value of the lease payments, on the balance sheet. In addition, it requires lessees to recognize a single lease cost, calculated so that the cost of the lease is allocated over the lease term, generally on a straight-line basis. In July 2018, the FASB issued ASU No. 2018-10, "Codification Improvements to Topic 842, Leases," and ASU No. 2018-11, "Leases (Topic 842)," which allow the application of the new guidance at the beginning of the year of adoption, recognizing a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption, in addition to the method of applying the new guidance retrospectively to each prior reporting period presented. The amendments in ASU No. 2018-10 and ASU No. 2018-11 have the same effective and transition requirements as ASU 2016-02.

This ASU will become effective for the Company in the first quarter of fiscal year 2019. The Company is evaluating the impact that the new accounting standard will have on its consolidated financial statements, which will consist primarily of a balance sheet gross up of right-of-use assets and lease liabilities on the consolidated balance sheets upon adoption, which will increase the Company's total assets and liabilities.

4. Earnings (Loss) Per Share

The following table sets forth the computation of basic and diluted income (loss) per share:

| | For the Years Ended December 31, | | |
|---|---|---|---|
| | 2018 | 2017 | 2016 |
| Net income (loss) per share: | | | |
| Numerator: | | | |
| Net income (loss) | $(157,957) | $(22,862) | $6,820 |
| Denominator: | | | |
| Weighted-average common shares outstanding - basic | 108,450 | 110,198 | 110,162 |
| Effect of potential dilutive common shares | — | — | 2,978 |
| Weighted-average common shares outstanding - diluted | 108,450 | 110,198 | 113,140 |
| Basic net income (loss) per share | $(1.46) | $(0.21) | $0.06 |
| Diluted net income (loss) per share | $(1.46) | $(0.21) | $0.06 |

For the years ended December 31, 2018, 2017 and 2016, options to purchase approximately 1.6 million, 1.5 million and 2.2 million shares, respectively, were excluded from the calculation because they were anti-dilutive after considering proceeds from exercise, taxes and related unrecognized stock-based compensation expense. For the years ended December 31, 2018 and 2017, an additional 2.4 million and 3.7 million shares, respectively, have been excluded from the weighted average dilutive shares because there was a net loss for the periods. These shares do not include the Company’s 2023 Notes and the 1.125% convertible senior notes due 2018 (the "2018 Notes"). The par amount of convertible notes is payable in cash equal to the principal amount of the notes plus any accrued and unpaid interest and then the “in-the-money” conversion benefit feature at the conversion price above $18.93 and $12.07, respectively, per share is payable in cash, shares of the Company’s common stock or a combination of both. The Company has the option to pay cash, issue shares of common stock or any combination thereof for the aggregate amount due upon conversion of the notes. The Company’s intent is to settle the principal amount of the notes in cash upon conversion. As a result, upon conversion of the notes, only the amounts payable in excess of the principal amounts of the notes are considered in diluted earnings per share under the treasury stock method. Refer to Note 10, "Convertible Notes” for more details.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

5. Intangible Assets and Goodwill

In the fourth quarter of 2018 and 2017, the Company performed its annual goodwill impairment analysis for the MID and RSD reporting units, which are the only reporting units with goodwill. The Company estimated the fair value of the reporting units using the income approach which was determined using Level 3 fair value inputs. The utilization of the income approach to determine fair value requires estimates of future operating results and cash flows discounted using an estimated discount rate. Cash flow projections are based on management's estimates of revenue growth rates and operating margins, taking into consideration industry and market conditions.

As of December 31, 2018, the fair value of the MID reporting unit, with $66.6 million of goodwill, exceeded the carrying value of its net assets by approximately 17% and the fair value of the RSD reporting unit, with $140.5 million of goodwill, exceeded the carrying value of its net assets by approximately 72%. Key assumptions used to determine the fair value of the MID and RSD reporting units at December 31, 2018, were the revenue growth rates for the forecast period and terminal year, terminal growth rates and discount rates. Certain estimates used in the income approach involve information for new product lines with limited financial history and developing revenue models which increase the risk of differences between the projected and actual performance. The discount rate of 16% for MID and 16.5% for RSD is based on the reporting units' overall risk profile relative to other guideline companies, market adoption of the Company's technology, the reporting units' respective industry as well as the visibility of future expected cash flows. The terminal growth rate applied to determine fair value for both reporting units was 3%, which was based on historical experience as well as anticipated economic conditions, industry data and long term outlook for the business. These assumptions are inherently uncertain.

As of December 31, 2017, the fair value of the MID reporting unit, with $66.6 million of goodwill, exceeded the carrying value of its net assets by approximately 270% and the fair value of the RSD reporting unit, with $143.0 million of goodwill, exceeded the carrying value of its net assets by approximately 155%. Key assumptions used to determine the fair value of the MID and RSD reporting units at December 31, 2017, were the revenue growth rates for the forecast period and terminal year, terminal growth rates and discount rates. Certain estimates used in the income approach involve information for new product lines with limited financial history and developing revenue models which increase the risk of differences between the projected and actual performance. The discount rate of 12% for MID and 16.5% for RSD is based on the reporting units' overall risk profile relative to other guideline companies, market adoption of the Company's technology, the reporting units' respective industry as well as the visibility of future expected cash flows. The terminal growth rate applied to determine fair value for both reporting units was 3%, which was based on historical experience as well as anticipated economic conditions, industry data and long term outlook for the business. These assumptions are inherently uncertain.

It is reasonably possible that the businesses could perform significantly below the Company's expectations or a deterioration of market and economic conditions could occur. This would adversely impact the Company's ability to meet its projected results, which could cause the goodwill in any of its reporting units or intangible assets in any of its asset groups to become impaired. Significant differences between these estimates and actual cash flows could materially affect the Company's future financial results. If the reporting units are not successful in commercializing new business arrangements, if the businesses are unsuccessful in signing new license agreements or renewing its existing license agreements, or if the Company is unsuccessful in managing its costs, the revenue and income for these reporting units could adversely and materially deviate from their historical trends and could cause goodwill or intangible assets to become impaired. If the Company determines that its goodwill or intangible assets are impaired, it would be required to record a non-cash charge that could have a material adverse effect on its results of operations and financial position.

Goodwill

The following tables present goodwill information for each of the reportable segments for the years ended December 31, 2018 and December 31, 2017:

| Reportable Segment: | December 31, 2017 | Impairment Charge of | Effect of Exchange | December 31, 2018 |
|---|---|---|---|---|

| | | Goodwill | Rates (1) | |
|---|---|---|---|---|
| | (In thousands) | | | |
| MID | $66,643 | $ — | $ — | $ 66,643 |
| RSD | 143,018 | — | (2,483 ) | 140,535 |
| Total | $209,661 | $ — | $ (2,483 ) | $ 207,178 |

(1) Effect of exchange rates relates to foreign currency translation adjustments for the period.

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

| Reportable Segment: | As of December 31, 2018 Gross Carrying Amount | Accumulated Impairment Losses | Net Carrying Amount |
|---|---|---|---|
| | (In thousands) | | |
| MID | $66,643 | $ — | $66,643 |
| RSD | 140,535 | — | 140,535 |
| Other | 21,770 | (21,770) | — |
| Total | $228,948 | $ (21,770) | $207,178 |

| Reportable Segment: | December 31, 2016 | Addition to Goodwill (1) | Impairment Charge of Goodwill | Effect of Exchange Rates (2) | December 31, 2017 |
|---|---|---|---|---|---|
| MID | $66,643 | $ — | $ — | $ — | $66,643 |
| RSD | 138,151 | 803 | — | 4,064 | 143,018 |
| Total | $204,794 | $ 803 | $ — | $ 4,064 | $209,661 |

(1) During the first quarter of 2017, the Company corrected an immaterial error related to an overstatement in prepaids and other current assets that originated in 2016.

(2) Effect of exchange rates relates to foreign currency translation adjustments for the period.

| Reportable Segment: | As of December 31, 2017 Gross Carrying Amount | Accumulated Impairment Losses | Net Carrying Amount |
|---|---|---|---|
| MID | $66,643 | $ — | $66,643 |
| RSD | 143,018 | — | 143,018 |
| Other | 21,770 | (21,770) | — |
| Total | $231,431 | $ (21,770) | $209,661 |

Intangible Assets

The components of the Company's intangible assets as of December 31, 2018 and December 31, 2017 were as follows:

| | Useful Life | As of December 31, 2018 Gross Carrying Amount | Accumulated Amortization | Net Carrying Amount |
|---|---|---|---|---|
| | | (In thousands) | | |
| Existing technology | 3 to 10 years | $258,903 | $ (213,824) | $ 45,079 |
| Customer contracts and contractual relationships | 1 to 10 years | 67,667 | (54,410) | 13,257 |
| Non-compete agreements and trademarks | 3 years | 300 | (300) | — |
| In-process research and development | Not applicable | 1,600 | — | 1,600 |
| Total intangible assets | | $328,470 | $ (268,534) | $ 59,936 |

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

| | | As of December 31, 2017 | | |
|---|---|---|---|---|
| | Useful Life | Gross Carrying Amount | Accumulated Amortization | Net Carrying Amount |
| | | (In thousands) | | |
| Existing technology | 3 to 10 years | $258,008 | $ (191,554) | $ 66,454 |
| Customer contracts and contractual relationships | 1 to 10 years | 68,794 | (48,626) | 20,168 |
| Non-compete agreements and trademarks | 3 years | 300 | (300) | — |
| In-process research and development | Not applicable | 5,100 | — | 5,100 |
| Total intangible assets | | $332,202 | $ (240,480) | $ 91,722 |

Included in customer contracts and contractual relationships are favorable contracts which are acquired software and service agreements where the Company has no performance obligations. Cash received from these acquired favorable contracts reduce the favorable contract intangible asset. During 2018 and 2017, the Company received $1.5 million and $3.6 million related to the favorable contracts, respectively. As of December 31, 2018 and 2017, the net balance of the favorable contract intangible assets was $0.9 million and $1.7 million, respectively. The estimated useful life is based on expected payment dates related to the favorable contracts.

During the years ended December 31, 2018 and 2017, the Company acquired patents related to its memory technology for an immaterial amount.

During the years ended December 31, 2018, 2017 and 2016, the Company did not sell any intangible assets.

Amortization expense for intangible assets for the years ended December 31, 2018, 2017, and 2016 was $29.3 million, $42.0 million, and $37.1 million, respectively. The estimated future amortization expense of intangible assets as of December 31, 2018 was as follows (amounts in thousands):

| Years Ending December 31: | Amount |
|---|---|
| 2019 | $20,177 |
| 2020 | 19,892 |
| 2021 | 12,975 |
| 2022 | 2,047 |
| 2023 | 1,526 |
| Thereafter | 1,719 |
| Total amortizable purchased intangible assets | 58,336 |
| In-process research and development | 1,600 |
| Total intangible assets | $59,936 |

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

6. Segments and Major Customers
Operating segments are based upon Rambus' internal organization structure, the manner in which its operations are managed, the criteria used by its Chief Operating Decision Maker ("CODM") to evaluate segment performance and availability of separate financial information regularly reviewed for resource allocation and performance assessment. The Company determined its CODM to be the Chief Executive Officer and determined its operating segments to be: (1) Memory and Interfaces Division ("MID"), which focuses on the design, development, manufacturing through partnerships and licensing of technology and solutions that is related to memory and interfaces; (2) Rambus Security Division ("RSD"), which focuses on the design, development, deployment and licensing of technologies for chip, system and in-field application security, anti-counterfeiting, smart ticketing and mobile payments; and (3) Emerging Solutions Division ("ESD"), which includes the Rambus Labs team and the development efforts in the area of emerging technologies.
On January 30, 2018, the Company announced its plans to close its lighting division ("RLD") including related manufacturing operations in Brecksville, Ohio. The Company believes that such business was not core to its strategy and growth objectives. As of December 31, 2018, the lighting division has been wound down. Refer to Note 15, “Restructuring Charges” for additional details.
For the year ended December 31, 2018, MID and RSD were considered reportable segments as they met the quantitative thresholds for disclosure as reportable segments. The results of the remaining operating segments are shown under “Other” which includes RLD.
The Company evaluates the performance of its segments based on segment operating income (loss), which is defined as revenue minus segment operating expenses. Segment operating expenses are comprised of direct operating expenses.
Segment operating expenses do not include sales, general and administrative expenses and the allocation of certain expenses managed at the corporate level, such as stock-based compensation, amortization, and certain bonus and acquisition costs. The “Reconciling Items” category includes these unallocated sales, general and administrative expenses as well as corporate level expenses.
The tables below present reported segment operating income (loss) for the years ended December 31, 2018, 2017 and 2016:

| | For the Year Ended December 31, 2018 | | | |
|---|---|---|---|---|
| | MID | RSD | Other | Total |
| | (In thousands) | | | |
| Revenues | $168,528 | $60,232 | $2,441 | $231,201 |
| Segment operating expenses | 94,999 | 53,177 | 14,560 | 162,736 |
| Segment operating income (loss) | $73,529 | $7,055 | $(12,119) | $68,465 |
| Reconciling items | | | | (155,432 ) |
| Operating loss | | | | $(86,967 ) |
| Interest and other income (expense), net | | | | 16,339 |
| Loss before income taxes | | | | $(70,628 ) |

| | For the Year Ended December 31, 2017 | | | |
|---|---|---|---|---|
| | MID | RSD | Other | Total |
| | (In thousands) | | | |
| Revenues | $280,704 | $96,663 | $15,729 | $393,096 |
| Segment operating expense | 86,044 | 50,010 | 33,860 | 169,914 |
| Segment operating income (loss) | $194,660 | $46,653 | $(18,131) | $223,182 |
| Reconciling items | | | | (168,775 ) |
| Operating income | | | | $54,407 |
| Interest and other income (expense), net | | | | (13,418 ) |
| Income before income taxes | | | | $40,989 |

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)

| | For the Year Ended December 31, 2016 | | | |
|---|---|---|---|---|
| | MID | RSD | Other | Total |
| | (In thousands) | | | |
| Revenues | $239,843 | $76,175 | $20,579 | $336,597 |
| Segment operating expenses | 68,460 | 51,855 | 30,397 | 150,712 |
| Segment operating income (loss) | $171,383 | $24,320 | $(9,818 ) | $185,885 |
| Reconciling items | | | | (152,243 ) |
| Operating income | | | | $33,642 |
| Interest and other income (expense), net | | | | (11,005 ) |
| Income before income taxes | | | | $22,637 |

The Company’s CODM does not review information regarding assets on an operating segment basis. Additionally, the Company does not record intersegment revenue or expense.

Accounts receivable from the Company's major customers representing 10% or more of total accounts receivable at December 31, 2018 and December 31, 2017, respectively, was as follows:

| | As of December 31, | |
|---|---|---|
| Customer | 2018 | 2017 |
| Customer 1 (MID reportable segment) | 12 % | * |
| Customer 2 (Other segment) | * | 12 % |
| Customer 3 (MID reportable segment) | 39 % | * |
| Customer 4 (MID and RSD reportable segment) | * | 13 % |
| Customer 5 (RSD reportable segment) | * | 11 % |

* Customer accounted for less than 10% of total accounts receivable in the period

Revenue from the Company’s major customers representing 10% or more of total revenue for the years ended December 31, 2018, 2017 and 2016 were as follows:

| | Years Ended December 31, | | |
|---|---|---|---|
| | 2018 | 2017 | 2016 |
| Customer A (MID and RSD reportable segments) | * | 17% | 19% |
| Customer B (MID reportable segment) | * | 13% | 20% |
| Customer C (MID reportable segment) | * | 13% | 13% |
| Customer D (MID reportable segment) | 15% | * | * |
| Customer E (MID and RSD reportable segments) | 11% | * | * |

Revenue from customers in the geographic regions based on the location of contracting parties is as follows: