

WIRELESS



AEROSPACE / DEFENSE



AUTOMOTIVE



ENERGY



IOT



NETWORK / CLOUD



Accelerating Innovation to Connect
and Secure the World



Keysight Technologies Inc.
1400 Fountaingrove Parkway
Santa Rosa California 95403

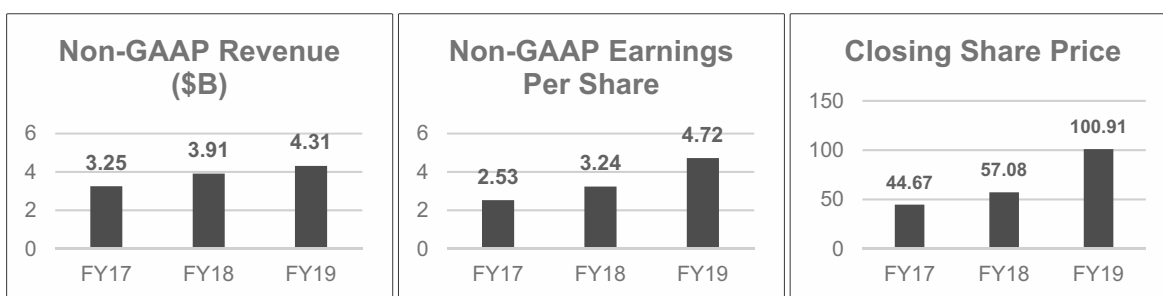
Ronald S. Nersesian
Chairman, President & Chief Executive Office

January 31, 2020

To our stockholders,

As Keysight concludes five years as an independent public company, I am pleased to report that 2019 was another exceptional year as we executed on our strategy and achieved record financial performance. We delivered revenue growth of 11 percent, or 11 percent on a non-GAAP core basis, and earnings per share growth of 277 percent, or 46 percent on a non-GAAP basis. These results were driven by the strength of our software-centric solutions, broad-based growth across multiple dimensions of the business, and the customer focus and operational discipline of our Keysight Leadership Model.

Since becoming an independent public company in November 2014, Keysight is proud to have delivered compounded annual non-GAAP revenue growth of 11 percent, 670 basis points of non-GAAP gross margin improvement, 17 percent compound annual non-GAAP EPS growth, and about 270% growth in our market capitalization. During our fiscal year 2019, Keysight's stock appreciated 77% and significantly outperformed the S&P 500 to rank in the top 1% of stocks in the index.



Over the last five years, we have successfully executed several strategic initiatives that resulted in strong, long-term value creation for shareholders, customers, and employees. We transformed the business model from hardware-centric products to software-centric solutions and structured around our end markets. We also made key strategic acquisitions and increased investment in R&D as we aligned our roadmap with long-term market growth trends.

Our strategy of innovation and differentiation combined with our commitment to our mission of accelerating innovation to connect and secure the world solidified Keysight's leadership in our target markets. Our broad portfolio of differentiated solutions assisted our global customer base in solving tough electronic measurement challenges. The Keysight Leadership Model, our operating framework for continued value creation, is a core element of our culture and has focused the organization on enabling the success of our customers. This customer-centric approach has aligned Keysight with key long-term secular growth trends in 5G, next-generation automotive, networking, IoT, and defense modernization.

We have seen customers' 5G investments accelerate as the mobile communications ecosystem has focused on bringing 5G networks and devices to market. The expansion of our software capabilities across the total communications workflow through acquisitions has generated strong returns for Keysight. This began with the acquisition of Anite in 2015, enabling our expansion into the software layers of test, which was a key differentiator of our 5G platform. The 2017 acquisition of Ixia broadened our reach within the communications development lifecycle to encompass a unique range of solutions. These solutions have enabled the development of next-generation technologies to optimize and secure networks.

To further accelerate the deployment of end-to-end communication solutions, we made the decision to integrate our Ixia Solutions Group and Communications Solutions Group. We believe this will improve go-to-market and product development alignment to foster growth across the entire communications ecosystem. In 2019, we also acquired Prisma Telecom Testing, a company based in Milan, Italy with deep software expertise and a decades-long track record of delivering network equipment manufacturing solutions. This acquisition has further enhanced our 5G portfolio and reinforced our leadership position. With the combined technology portfolios of Keysight, Anite, Ixia, and Prisma, we are delivering solutions across the entire communications workflow from end-to-end and up and down the stack, realizing significant share gains in the 5G market.

Automotive manufacturers and suppliers have continued to invest in critical new capabilities and have turned to Keysight as a strategic innovation partner. By integrating our solutions, we have deepened engagements with OEM and Tier 1 customers. The 2017 acquisition of ScienLab expanded our automotive and energy solutions offerings and extended our leadership in this market. As we focused on supporting our automotive customers as they accelerate innovation, we committed to serving them in close proximity to their design hubs. In 2019, we opened an automotive customer center in Nagoya, Japan. We now have four automotive customer centers aligned with each of the major global automotive customer ecosystems: Detroit, Michigan; Boeblingen, Germany; Nagoya, Japan; and Shanghai, China.

Both software and services have become a larger part of our business and are key differentiators in our solutions while also providing recurring revenue. Software grew double digits this year and now represents 19% of total Keysight orders. Customer demand for our 5G solutions, design software, and network visibility solutions was strong, contributing to these results. We continued to make progress on our PathWave strategy, which is our framework for analytics and information flow across the customer design process. In 2019, we reached an important milestone with the announcement of PathWave Test 2020, which delivers an integrated experience for leading electronic manufacturers, accelerating the time-to-market of their digital and wireless platforms and products, including 5G, IoT, and automotive electronics.

Services are another important element of our solution-centric engagement with customers. We achieved all-time highs for both services orders and revenue with 2019 orders surpassing \$550 million. At the start of 2019, we aligned our services business with our industry-focused business groups to accelerate growth in this area. We also launched new support offerings, like KeysightCare in 2019, providing value for customers and contributing to our margin expansion.

As we delivered market-leading growth and enabled the continued success of our customers, we are proud to have maintained strong profitability and financial discipline. Free cash flow for the year was \$878 million, representing 20 percent of non-GAAP revenue and 97 percent of non-GAAP income, well ahead of our 80-90 percent free cash flow conversion target. In 2019 we also repurchased approximately 2.1 million shares at an average share price of \$76.32 for a total consideration of \$160 million.

Corporate social responsibility (CSR) remains an important part of our operating framework and is emphasized in the Keysight Leadership Model. In May 2019, we issued our annual CSR report outlining our commitments and key impact results in conserving natural resources, supporting next-generation technologists through education processes and programs, and strengthening local communities. In 2019, we were proud to have been recognized externally for our achievements in the area, including placing sixteenth in the 2020 America's Most JUST Companies list by Forbes and JUST Capital, ranking number 34 on Barron's 100 Most Sustainable Companies list, and being included in several CSR-focused indices, such as the Dow Jones Sustainability Index.

In summary, 2019 was an exceptional year of record performance as our strategy of innovation and differentiation solidified Keysight's leadership in our target markets. It's an exciting time for our shareholders, customers, and employees, and we believe we are just getting started.

Thank you for your continued support.

A handwritten signature in black ink, appearing to read "Ron Mu", followed by a horizontal line extending to the right.

Keysight at a Glance

Keysight Technologies, Inc. (“we,” “us,” “Keysight” or the “company”), incorporated in Delaware on December 6, 2013, is a technology company that helps enterprises, service providers and governments accelerate innovation to connect and secure the world by providing electronic design and test solutions that are used in the simulation, design, validation, manufacture, installation, optimization and secure operation of electronics systems in the communications, networking and electronics industries. We also offer customization, consulting and optimization services throughout the customer’s product lifecycle, including start-up assistance, asset management, up-time services, application services and instrument calibration and repair.

We have a comprehensive sales strategy that uses our direct sales force, distributors, resellers and manufacturer’s representatives. The strategy varies based on the size of customer, the complexity of solutions and geographical coverage. We generated \$4.3 billion, 3.9 billion, and \$3.2 billion of net revenue in 2019, 2018, and 2017, respectively. As of October 31, 2019, we had approximately 13,600 employees worldwide.

Net revenue, income from operations and assets by business segment as of and for the fiscal years ended October 31, 2019, 2018, and 2017 are shown in Note 19, “Segment Information,” to our consolidated financial statements.

We had more than 17,500 direct customers for our solutions and services in fiscal year 2019 and greater than 32,000 customers including indirect channels. No single customer represented 10 percent or more of our net revenue. Many of our customers acquire solutions and services across multiple segments.

Operating Segments	2019 Net Revenue	Description
Communications Solutions Group	\$2.7 billion	<p>Summary: The Communications Solutions Group serves customers spanning the worldwide commercial communications and aerospace, defense and government end markets. The group provides electronic design and test software, instruments and systems and related services used in the simulation, design, validation, manufacturing, installation and optimization of electronic equipment.</p> <p>Markets: The markets for our communications solutions group include the commercial communications market and the aerospace, defense and government market.</p> <p><u>Commercial Communications Market:</u> We market our electronic design and test solutions to network equipment manufacturers (“NEMs”), wireless device manufacturers and communications service providers, including the component manufacturers within the supply chain for these customers. Growth in mobile data traffic and increasing complexity in semiconductors and components are drivers of test demand across the communications market.</p> <p><u>Aerospace, Defense and Government Market:</u> We market our electronic design and test solutions to manufacturers and research laboratories within the aerospace and defense industries. This market includes commercial and government customers and their contracted suppliers. Electronic warfare and modernization of satellites, radars and surveillance systems worldwide are the drivers of test demand within the aerospace and defense market.</p> <p>Government customers include departments or ministries of defense and related agencies around the world. Contractors support the government and commercial customers by providing design and manufacturing capabilities for a variety of programs. We also sell to sub-contractors and component manufacturers within the supply chain.</p> <p>Solutions: Our electronic design and test solutions include software-driven radio-frequency and microwave instruments, digital instruments and various other general-purpose test instruments and targeted test solutions. We offer these products and related software in a variety of form factors, including feature-rich, modular and handheld solutions, depending on the specific requirements of the customer application.</p>

Operating Segments	2019 Net Revenue	Description
		<p>Customers: Our customers include commercial companies and government agencies around the world. We have customers across the product lifecycle that design, develop, manufacture, install and monitor a variety of commercial and government communications networks. Commercial customers include original equipment and contract manufacturers of electronic components, semiconductors, wireless devices and network equipment, as well as network service providers that implement, maintain and manage communication networks and services. Other commercial customers include defense contractors and sub-contractors. Government customers include departments or ministries of defense, government agencies and related research institutes. Our customers use our solutions to conduct research and development to manufacture, and to install and maintain radio frequency, microwave frequency, digital, semiconductor and optical products and systems.</p> <p>No single customer represented 10 percent or more of the group's net revenue.</p>
Electronic Industrial Solutions Group	\$1 billion	<p>Summary: The Electronic Industrial Solutions Group provides test and measurement solutions across a broad set of electronic industrial end markets, focusing on high-value applications in the automotive and energy industry and measurement solutions for consumer electronics, education, general electronics design and manufacturing, and semiconductor design and manufacturing. The group provides electronic design and test software, instruments and systems used in the simulation, design, validation, manufacturing, installation and optimization of electronic equipment.</p> <p>Markets: We market our electronic design and test solutions to customers with significant electronic content across a broad set of electronic industrial end markets. These industries design, develop and manufacture a wide range of products, including those produced in high volumes, such as computers, computer peripherals, electronic components, consumer electronics, enterprise servers, storage networks and automotive electronics. The components, printed circuit assemblies and functional devices for these products may be designed, developed and manufactured by electronic components companies, original equipment manufacturers or contract manufacturers. Other industrial applications for our solutions include power, energy, automotive, medical, research and education.</p> <p>Product Areas: Our software-driven electronic industrial solutions include design and design verification tools, a broad range of electronic test and measurement instruments, comprehensive manufacturing systems, material analysis and university education solutions to train the next generation of engineers and scientists.</p>

Operating Segments	2019 Net Revenue	Description
		<p>Customers: Our customers include original equipment manufacturers and contract manufacturers of electronic industrial products and services. These customers use our solutions to perform research and development and to design, manufacture and support their products and services. Customer products include semiconductor devices, printed circuit assemblies, electronic modules and systems. Our customers range from the largest multi-national global companies to the smallest start-ups and include universities and government agencies around the world. Our automotive customers use Keysight's solutions to develop, test and manufacture the electrified drive train, battery management systems, e-mobility and vehicle-to-everything communications that will enable electric and hybrid-electric vehicles to be fully autonomous.</p> <p>No single customer represented 10 percent or more of the group's net revenue.</p>
Ixia Solutions Group	\$490 million	<p>Summary: The Ixia Solutions Group helps customers design, validate and optimize the performance and security resilience of their networks and associated components and applications. The test, visibility and security solutions help organizations and their customers strengthen their physical and virtual networks. The group's solutions consist of high-performance hardware platforms, software applications and services, including warranty and maintenance offerings.</p> <p>Markets: We market our network test solutions and services, and our network visibility solutions to network equipment manufacturers, service providers, enterprises and governments worldwide. Our network test customers use our solutions to evaluate the performance of their equipment and networks during the design, manufacturing and pre-deployment stages, as well as after the equipment is deployed in a network. Our network visibility solutions improve the way our customers manage their data centers, save valuable IT time and maximize return on IT investments.</p> <p>Product Areas: We offer a comprehensive suite of solutions consisting of software applications in conjunction with our network test hardware platforms that provide customers with the ability to perform a broad range of testing for layers 2-7 of the network stack. Additionally, our visibility solutions provide real-time, end-to-end visibility, insight and security into physical, virtual, Software Defined Networking and Network Functions Virtualization networks, delivering the control, coverage, intelligence and performance customers need in a seamless fashion to protect and improve crucial networking, data center and cloud business assets.</p>

Operating Segments	2019 Net Revenue	Description
		<p>Customers: Our customers include NEMs, service providers, enterprises and governments. These customers seek to optimize networks and data centers in order to accelerate, secure and scale the delivery of these applications. NEMs, including chipset providers, deliver voice, video, and data and service infrastructure equipment to customer network operators, service providers and network users. Such users require high standards of functionality, performance, security and reliability and must ensure the quality of their products during development and manufacturing (prior to deployment). Service providers seek to deliver a growing variety of high quality, advanced network services ranging from traditional telecommunications and internet services to social networking, cloud storage and entertainment streaming. Enterprise and government organizations depend on their networks and data centers to get business done, and they devote significant resources to ensure applications and services run optimally and securely. These enterprise and government customers rely on our solutions to help evaluate equipment during selection, optimize and harden their network designs in labs prior to roll-out, and once rolled out, continuously monitor the production network to ensure optimal performance and security of the contents flowing through it. Our security solutions are also used by major organizations to train their staff on the new generation of cyber warfare and mitigation techniques to recognize and defend against massive cyber attacks.</p> <p>No single customer represented 10 percent or more of the group's net revenue.</p>

**Senior
Executives**

Ronald S. Nersesian*

President and
Chief Executive Officer

Neil Dougherty*

Senior Vice President and
Chief Financial Officer

Jay Alexander*

Senior Vice President, and Chief
Technology Officer

Satish Dhanasekaran*

Senior Vice President and
President, Communications
Solutions Group

Ingrid Estrada*

Senior Vice President,
Chief People and Administrative
Officer

Soon Chai Gooi*

Senior Vice President and
President, Electronic Industrial
Solutions Group

Marie Hattar

Chief Marketing Officer

Jeffrey K. Li*

Senior Vice President, General
Counsel and Secretary

John Page*

Senior Vice President and
President, Services Solutions
Group

John Skinner*

Vice President,
Corporate Controller and Principal
Accounting Officer

Mark Wallace*

Senior Vice President, Worldwide
Sales

Directors

Ronald S. Nersesian

Chairman of the Board, President
and Chief Executive Officer,
Keysight Technologies, Inc.

Paul N. Clark

Former Chairman, President and
CEO of ICOS Corporation

James G. Cullen

Non-executive Chairman, Agilent
Technologies, Inc.
Former President and Chief
Operating Officer, Bell Atlantic

Charles J. Dockendorff

Former Executive Vice President
and Chief Financial Officer,
Covidien, PLC

Jean M. Halloran

Former Senior Vice President,
Agilent Technologies, Inc.

Richard P. Hamada

Former Chief Executive Officer,
Avnet, Inc.

Paul A. Lacouture

Former Executive Vice President,
Verizon Telecom

Joanne B. Olsen

Former Executive Vice President,
Oracle Corporation

Robert A. Rango

Chief Executive Officer, Enevate
Corporation
Former Executive Vice President,
Mobile & Wireless Group,
Broadcom Corporation

**Board
Committees**

Audit and Finance Committee

Charles J. Dockendorff,
Chairperson
Paul N. Clark
Paul A. Lacouture
Robert A. Rango

Compensation Committee

James G. Cullen,
Chairperson
Jean M. Halloran
Richard P. Hamada
Joanne B. Olsen

**Nominating and Corporate
Governance Committee**

Paul N. Clark
Chairperson
James G. Cullen
Charles J. Dockendorff
Jean M. Halloran
Richard P. Hamada
Paul A. Lacouture
Joanne B. Olsen
Robert A. Rango

Executive Committee

Paul N. Clark
Ronald S. Nersesian,
Chairperson

Keysight's annual meeting of stockholders will take place on Thursday, March 19, 2020 at 8:00 a.m. at Keysight Technologies, Inc., located at 1400 Fountaingrove Parkway, Santa Rosa, California 95403.

**These individuals are current executive officers of Keysight under Section 16 of the Securities Act of 1934*

Investor Information

Please see the full and audited financial statements and footnotes contained in this booklet. To receive paper copies of the annual report, proxy statement, Form 10-K, earnings announcements and other financial information, you should call (707) 577-6915. In addition, you can access this financial information at Keysight's Investor Relations Website. The address is <http://www/investor.keysight.com>. This information is also available by writing to the address provided under the Investor Contact heading below.

Corporate Governance, Business Conduct and Ethics

Keysight's Corporate Governance Guidelines, the charters of our Audit and Finance Committee, our Compensation Committee, our Executive Committee and our Nominating and Corporate Governance Committee, as well as our Standards of Business Conduct (including code of ethics provisions that apply to our principal executive officer, principal financial officer, principal accounting officer and senior financial officers) are available on our website at www.investor.keysight.com under "Corporate Governance." These items are also available in print to any stockholder by calling (707) 577-6915. This information is also available by writing to the company at the address provided below.

Keysight Headquarters

Keysight Technologies, Inc.
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
Phone: (800) 829-4444

Transfer Agent and Registrar

Please contact our transfer agent, at the phone number or address listed below, with any questions about stock certificates, transfer of ownership or other matters pertaining to your stock account.

Written Request:

Computershare
P.O. Box 505000
Louisville, KY 40233-5000

Overnight Delivery:

Computershare
462 South 4th Street, Suite 1600
Louisville, KY 40202

Telephone Inquiries:

Within the U.S., Canada, or Puerto Rico: (877) 373-6374
Non-U.S.: (781) 575-2879

Investor Center Website: www-us.computershare.com/investor/contact

Email for Computershare: web.queries@computershare.com

Investor Contact

Keysight Technologies, Inc.
Investor Relations Department
1400 Fountaingrove Parkway
Santa Rosa, CA 95403
Email: investor.relations@keysight.com
Phone: (707) 577-6915

Common Stock

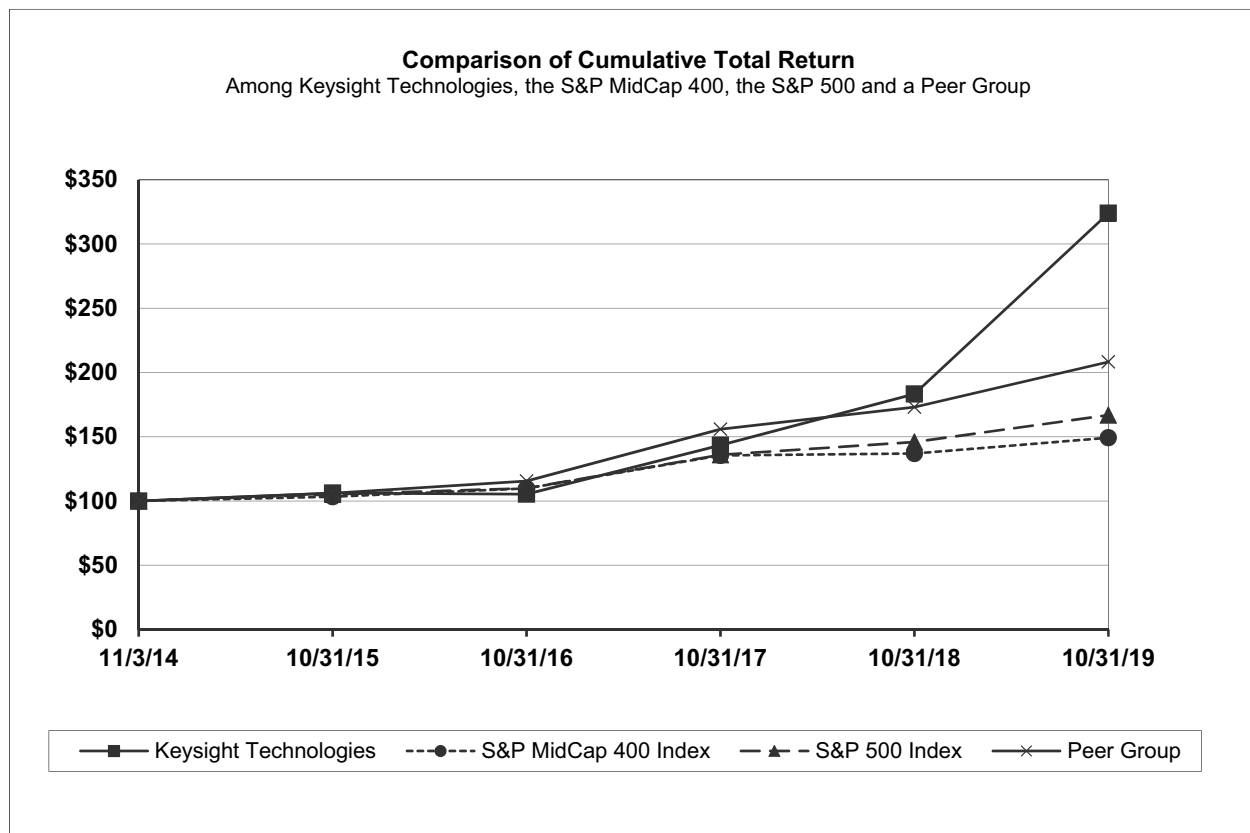
Our common stock is listed on the New York Stock Exchange (“NYSE”) with the ticker symbol “KEYS.”

There were 19,924 shareholders of record of Keysight common stock as of December 16, 2019.

We have not paid any dividends, and we do not anticipate paying any cash dividends in the foreseeable future. All decisions regarding the declaration and payment of dividends and stock repurchases are at the discretion of our Board of Directors and will be evaluated regularly in light of our financial condition, earnings, growth prospects, funding requirements, applicable law, and any other factors that our Board deems relevant.

Stock Price Performance Graph

The graph below shows the cumulative total stockholder return, assuming the investment of \$100 (and the reinvestment of any dividends thereafter) for the period beginning on November 3, 2014, and ending on October 31, 2019, on each of: Keysight’s common stock; the S&P MidCap 400 Index; the S&P 500 Index; and our Peer Group which includes all companies in the S&P 500 Industrials Sector and the S&P 500 Information Technology Sector. A complete list of the companies in the Peer Group is provided below. Keysight’s stock price performance shown in the following graph is not indicative of future stock price performance. The data for this performance graph was compiled for us by Standard and Poor’s.



Peer Group

(Companies in the S&P 500 Industrials Sector and the S&P 500 Information Technology Sector)

3M Company

A. O. Smith Corporation

Accenture plc

Adobe Inc.

Advanced Micro Devices, Inc.

Akamai Technologies, Inc.

ANSYS, Inc.

Apple Inc.

Applied Materials, Inc.

Arconic Inc.

Arista Networks, Inc.

Autodesk, Inc.

Alaska Air Group, Inc.	Automatic Data Processing, Inc.
Allegion plc	Broadcom Inc.
Alliance Data Systems Corporation	Broadridge Financial Solutions, Inc.
American Airlines Group Inc.	C.H. Robinson Worldwide, Inc.
AMETEK, Inc.	Cadence Design Systems, Inc.
Amphenol Corporation	Caterpillar Inc.
Analog Devices, Inc.	CDW Corporation
Cintas Corporation	KLA Corporation
Cisco Systems, Inc.	L3Harris Technologies, Inc.
Citrix Systems, Inc.	Lam Research Corporation
Cognizant Technology Solutions Corporation	Leidos Holdings, Inc.
Copart, Inc.	Lockheed Martin Corporation
Corning Incorporated	Masco Corporation
CSX Corporation	Mastercard Incorporated
Cummins Inc.	Maxim Integrated Products, Inc.
Deere & Company	Microchip Technology Incorporated
Delta Air Lines, Inc.	Micron Technology, Inc.
Dover Corporation	Microsoft Corporation
DXC Technology Company	Motorola Solutions, Inc.
Eaton Corporation plc	NetApp, Inc.
Emerson Electric Co.	Nielsen Holdings plc
Equifax Inc.	Norfolk Southern Corporation
Expeditors International of Washington, Inc.	Northrop Grumman Corporation
F5 Networks, Inc.	NVIDIA Corporation
Fastenal Company	Oracle Corporation
FedEx Corporation	PACCAR Inc
Fidelity National Information Services, Inc.	Parker-Hannifin Corporation
Fiserv, Inc.	Paychex, Inc.
FleetCor Technologies, Inc.	PayPal Holdings, Inc.
FLIR Systems, Inc.	Pentair plc
Flowserve Corporation	Qorvo, Inc.
Fortinet, Inc.	QUALCOMM Incorporated
Fortive Corporation	Quanta Services, Inc.
Fortune Brands Home & Security, Inc.	Raytheon Company
Gartner, Inc.	Republic Services, Inc.
General Dynamics Corporation	Robert Half International Inc.
General Electric Company	Rockwell Automation, Inc.
Global Payments Inc.	Rollins, Inc.
Hewlett Packard Enterprise Company	Roper Technologies, Inc.
Honeywell International Inc.	salesforce.com, inc.
HP Inc.	Seagate Technology plc
Huntington Ingalls Industries, Inc.	Skyworks Solutions, Inc.
IDEX Corporation	Snap-on Incorporated
IHS Markit Ltd.	Southwest Airlines Co.
Illinois Tool Works Inc.	Stanley Black & Decker, Inc.
Ingersoll-Rand Plc	Symantec Corporation
Intel Corporation	Synopsys, Inc.
International Business Machines Corporation	TE Connectivity Ltd.
Intuit Inc.	Texas Instruments Incorporated
IPG Photonics Corporation	Textron Inc.
J.B. Hunt Transport Services, Inc.	The Boeing Company

Jack Henry & Associates, Inc.
Jacobs Engineering Group Inc.
Johnson Controls International plc
Juniper Networks, Inc.
Kansas City Southern
Keysight Technologies, Inc.
United Technologies Corporation
VeriSign, Inc.
Verisk Analytics, Inc.
Visa Inc.
W.W. Grainger, Inc.
Wabtec Corporation

The Western Union Company
TransDigm Group Incorporated
Union Pacific Corporation
United Airlines Holdings, Inc.
United Parcel Service, Inc.
United Rentals, Inc.
Waste Management, Inc.
Western Digital Corporation
Xerox Holdings Corporation
Xilinx, Inc.
Xylem Inc.

Additional Information

This annual report, including the letter titled “To our stockholders,” contains forward-looking statements including, without limitation, statements regarding trends, seasonality, cyclicity and growth in, and drivers of, the markets we sell into, our strategic direction, our future effective tax rate and tax valuation allowance, earnings from our foreign subsidiaries, remediation activities, new solution and service introductions, the ability of our solutions to meet market needs, changes to our manufacturing processes, the use of contract manufacturers, the impact of local government regulations on our ability to pay vendors or conduct operations, our liquidity position, our ability to generate cash from operations, growth in our businesses, our investments, the potential impact of adopting new accounting pronouncements, our financial results, our purchase commitments, our contributions to our pension plans, the selection of discount rates and recognition of any gains or losses for our benefit plans, our cost-control activities, savings and headcount reduction recognized from our restructuring programs and other cost saving initiatives, and other regulatory approvals, the integration of our completed acquisitions and other transactions, our transition to lower-cost regions, the existence of political or economic instability, and our and the combined group’s estimated or anticipated future results of operations, that involve risks and uncertainties. Our actual results could differ materially from the results contemplated by these forward-looking statements due to various factors, including but not limited to those risks and uncertainties discussed in Item 1A and elsewhere in our Form 10-K for the year ended October 31, 2019, filed with the Securities and Exchange Commission (“SEC”) on December 18, 2019.

The materials contained in this annual report are as of December 16, 2019, unless otherwise noted. The content of this annual report contains time-sensitive information that is accurate only as of this date. If any portion of this annual report is redistributed at a later date, Keysight will not be reviewing or updating the material in this report.

This annual report contains Keysight’s 2019 audited financial statements and notes thereto in the following section of this booklet with the tab “Annual Report Financials.” Within the Annual Report Financials, please refer to “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and “Risks, Uncertainties and Other Factors That May Affect Future Results” for more complete information on each of our businesses and Keysight as a whole.

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SELECTED FINANCIAL DATA
(unaudited)

The following table presents the selected combined and consolidated financial data, which should be read in conjunction with our consolidated financial statements and related notes and Management's Discussion and Analysis of Financial Condition and Results of Operations included elsewhere in our Form 10-K. We derived the selected financial data as of October 31, 2019 and for each of the fiscal years in the three-year period ended October 31, 2019 from our audited consolidated financial statements included elsewhere in our Form 10-K. We derived the selected financial data as of October 31, 2016 and October 31, 2015 from audited combined financial statements that are not included in our Form 10-K.

Our historical combined and consolidated financial statements before November 1, 2014 include certain expenses of Agilent that were allocated to us for certain functions, including general corporate expenses related to information technology, research and development, finance, legal, insurance, compliance and human resources activities. These costs may not be representative of the costs we have incurred or will incur as an independent public company. The historical financial information included here may not necessarily reflect our financial position and results of operations or what our financial position and results of operations would have been had we been an independent, publicly-traded company during the historical periods presented or be indicative of our future performance as an independent company.

	Years Ended October 31,				
	2019	2018	2017	2016	2015
	(in millions, except per share data)				
Consolidated Statement of Operations Data: ^(a)					
Net revenue	\$4,303	\$3,878	\$3,189	\$2,918	\$2,856
Income (loss) before taxes	\$ 715	\$ (411)	\$ 179	\$ 366	\$ 388
Net income.	\$ 621	\$ 165	\$ 102	\$ 335	\$ 513
Net income per share					
Basic.	\$ 3.31	\$ 0.88	\$ 0.57	\$ 1.97	\$ 3.04
Diluted	\$ 3.25	\$ 0.86	\$ 0.56	\$ 1.95	\$ 3.00
Weighted average shares used in computing net income per share:					
Basic.	188	187	180	170	169
Diluted	191	191	182	172	171

(a) Fiscal years 2019, 2018 and 2017 financial data includes our acquisition of Ixia on April 18, 2017.

	October 31,				
	2019	2018	2017	2016	2015
	(in millions)				
Consolidated Balance Sheet Data: ^(a)					
Cash and cash equivalents	\$1,598	\$ 913	\$ 818	\$ 783	\$ 483
Working capital	\$2,212	\$ 916	\$1,358	\$1,210	\$ 893
Total assets.	\$6,623	\$5,824	\$5,933	\$3,796	\$3,501
Long-term debt	\$1,788	\$1,291	\$2,038	\$1,093	\$1,092
Stockholders' equity	\$3,004	\$2,433	\$2,310	\$1,513	\$1,302

(a) Fiscal years 2019, 2018 and 2017 financial data reflect the impact of our acquisition of Ixia on April 18, 2017.

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITIONS AND RESULTS OF OPERATIONS

You should read the following discussion in conjunction with the consolidated financial statements and notes thereto included elsewhere in our Annual Report on Form 10-K. This Management's Discussion and Analysis of Financial Condition and Results of Operations contains forward-looking statements. The forward-looking statements contained herein include, without limitation, statements regarding trends, seasonality, cyclicalities and growth in, and drivers of, the markets we sell into, our strategic direction, our future effective tax rate and tax valuation allowance, earnings from our foreign subsidiaries, remediation activities, new solution and service introductions, the ability of our solutions to meet market needs, changes to our manufacturing processes, the use of contract manufacturers, the impact of local government regulations on our ability to pay vendors or conduct operations, our liquidity position, our ability to generate cash from operations, growth in our businesses, our investments, the potential impact of adopting new accounting pronouncements, our financial results, our purchase commitments, our contributions to our pension plans, the selection of discount rates and recognition of any gains or losses for our benefit plans, our cost-control activities, savings and headcount reduction recognized from our restructuring programs and other cost saving initiatives, and other regulatory approvals, the integration of our completed acquisitions and other transactions, our transition to lower-cost regions, the existence of political or economic instability, and our and the combined group's estimated or anticipated future results of operations, that involve risks and uncertainties. Our actual results could differ materially from the results contemplated by these forward-looking statements due to various factors, including but not limited to those risks and uncertainties discussed in Part I Item 1A and elsewhere in our Form 10-K.

Overview and Executive Summary

Keysight Technologies, Inc. ("we," "us," "Keysight" or the "company"), incorporated in Delaware on December 6, 2013, is a technology company providing electronic design and test solutions that are used in the design, development, manufacture, installation, deployment, validation, optimization and secure operation of electronics systems to communications, networking and electronics industries. We also offer customization, consulting and optimization services throughout the customer's product lifecycle, including start-up assistance, instrument productivity, application services and instrument calibration and repair.

In 2019 we completed an organizational change to align our services business with our customer-solutions-oriented, go-to-market strategy as reflected by our Keysight Leadership Model ("KLM"). This change enables us to provide our customers with complete solutions that incorporate both leading product capabilities and the appropriate services and support. Our services delivery is now fully reflected within the markets served, which is a further catalyst of the growth of our services solutions portfolio. Prior period segment results were revised to conform to the presentation. As a result, Keysight has three segments: Communications Solutions Group, Electronic Industrial Solutions Group and Ixia Solutions Group. The organizational structure continues to include centralized enterprise functions that provide support across the groups.

To more effectively and efficiently address customer solution needs across the communications ecosystem as the network transforms, in the first quarter of fiscal 2020, we completed an organizational change to manage our Ixia Solutions Group within our Communications Solutions Group. We believe this realignment will create improved go-to-market and product development alignment, as well as accelerate solution synergies in 5G as this new technology is deployed globally. As a result, beginning with our first quarter of fiscal 2020, we will have two reportable operating segments, Communications Solutions Group ("CSG") and Electronic Industrial Solutions Group ("EISG").

Years ended October 31, 2019, 2018 and 2017

Total orders for the year ended October 31, 2019 were \$4,441 million, an increase of 9 percent when compared to 2018. Foreign currency movements had an unfavorable impact of 1 percentage point on the year-over-year comparison. Orders associated with acquisitions and divestitures had a net neutral impact on the order growth for the year ended October 31, 2019 when compared to 2018. Order growth in Asia Pacific and the Americas was partially offset by a decline in Europe. Total orders for the year ended October 31, 2018 were \$4,082 million, an increase of 20 percent when compared to 2017. Foreign currency movements had a favorable impact of 1 percentage point on the year-over-year comparison. Orders associated with acquisitions accounted for 7 percentage points of order growth for the year ended October 31, 2018 when compared to 2017. Orders grew across all regions.

Net revenue of \$4,303 million for the year ended October 31, 2019 increased 11 percent when compared to 2018. Foreign currency movements had an unfavorable impact of 1 percentage point on the year-over-year comparison. Revenue associated with acquisitions and divestitures had a net neutral impact on the revenue growth for the year ended October 31, 2019 when compared to 2018. The Communications Solutions Group led overall revenue growth with strong growth in the commercial communications market, complemented by growth in the Ixia Solutions Group and the Electronic Industrial Solutions Group. Revenue from the Communications Solutions Group, Electronic Industrial Solutions Group and Ixia Solutions Group represented approximately 63 percent, 26 percent and 11 percent respectively, of the total revenue for the year ended October 31, 2019. Net revenue of \$3,878 million for the year ended October 31, 2018 increased 22 percent when compared to 2017. Foreign currency movements had a favorable impact of 2 percentage points on the year-over-year comparison. Revenue associated with acquisitions accounted for 6 percentage points of revenue growth for the year ended October 31, 2018 when compared to 2017. For the same period, revenue excluding acquisitions and foreign currency movements grew 14% year over year, with growth in all our operating segments and across all our markets. Revenue from the Communications Solutions Group, Electronic Industrial Solutions Group and Ixia Solutions Group represented approximately 62 percent, 27 percent and 11 percent, respectively, of the total revenue for the year ended October 31, 2018 and approximately 65 percent, 29 percent and 6 percent, respectively, of the total revenue for the year ended October 31, 2017. Ixia Solutions Group revenue for 2017 included activity from the date of acquisition, April 18, 2017, through October 31, 2017.

Net income was \$621 million in 2019 compared to net income of \$165 million and \$102 million in 2018 and 2017, respectively. The increase in net income for the year ended October 31, 2019 when compared to 2018 was driven by a significant non-recurring goodwill impairment charge in 2018, higher revenue volume, highly differentiated solutions, favorable mix, and lower acquisition and integration costs, partially offset by a favorable income tax benefit in the prior period from new U.S. tax legislation and higher research and development investments in leading-edge technologies and key growth opportunities in our end markets. The increase in net income for the year ended October 31, 2018 when compared to 2017 was driven by higher revenue volume and a favorable tax impact from the new U.S. tax legislation and Singapore tax incentives, partially offset by an unfavorable impact from a goodwill impairment charge and increases in variable people-related costs. In 2019, 2018 and 2017, we generated operating cash flows of \$998 million, \$555 million and \$328 million, respectively.

Impact of Northern California Wildfires

During the week of October 8, 2017, wildfires in northern California adversely impacted the Keysight corporate headquarters site in Santa Rosa, CA. While direct damage to our core facilities was limited, our buildings did experience some smoke and other fire-related impacts. Keysight is insured for the damage caused by the fire.

In 2019, 2018 and 2017, we recognized operating expenses of \$3 million, \$97 million and \$18 million, respectively, offset by income of \$3 million, \$90 million and \$2 million, respectively, for expected insurance recoveries. Expenses were primarily for cleaning and restoration activities, write-off of damaged fixed assets and other direct costs related to recovery from this event.

In 2019 and 2018, we received insurance proceeds of \$22 million and \$68 million, respectively, which has substantially covered our total fire-related expenses in excess of our \$10 million self-insured retention amount. At October 31, 2019, we had a receivable of \$5 million for losses and expenses for which insurance reimbursement is probable. The receivable is included in other current assets in the consolidated balance sheet.

In addition, in 2019 and 2018, we made investments in property, plant and equipment related to fire recovery of \$7 million and \$27 million, respectively, that are expected to be covered by insurance.

Subsequent to October 31, 2019, we received \$37 million of insurance proceeds primarily related to replacement of capital and recovery of fire-related expenses. These proceeds will result in an other operating gain of approximately \$32 million in the first quarter of fiscal 2020. No additional insurance proceeds or material expenses related to the 2017 northern California wildfires are expected.

Outlook

Our strategy of bringing solutions to market that help customers develop new technologies and accelerate innovation provides a platform for long-term growth. We expect to continue to see our customers make R&D investments in certain next-generation technologies. We are still in the early market stages for these emerging technologies, such as 5G, next-generation automotive, internet of things (“IoT”) and defense modernization and

expect technology investments to continue. Internally, we are working to improve operational efficiency across all functions. We continue to closely monitor the current macro environment related to trade, tariffs, monetary and fiscal policies. We have complied and will continue to comply with recent U.S. Department of Commerce export control regulations regarding China. While short-term uncertainties exist, we remain confident in our strategy and believe we are well-positioned to capture future growth opportunities.

Currency Exchange Rate Exposure

Our revenues, expenses, and monetary assets and liabilities are exposed to changes in foreign currency exchange rates as a result of our global operating and financing activities. We hedge revenues, expenses and balance sheet exposures that are not denominated in the functional currencies of our subsidiaries on a short-term and anticipated basis. The result of the hedging has been included in our consolidated statement of operations. We experience some fluctuations within individual lines of the consolidated balance sheet and consolidated statement of operations because our hedging program is not designed to offset the currency movements in each category of revenues, expenses, monetary assets and liabilities. Our hedging program is designed to hedge currency movements on a relatively short-term basis of up to twelve months in advance. Therefore, we are exposed to currency fluctuations over the longer term. To the extent that we are required to pay for all, or portions, of an acquisition price in foreign currencies, we may enter into foreign exchange contracts to reduce the risk that currency movements will impact the U.S. dollar cost of the transaction.

Results from Operations - Years ended October 31, 2019, 2018 and 2017

Net Revenue

Revenue is recognized upon transfer of control of the promised products or services to customers in an amount that reflects the consideration we expect to receive in exchange for those products or services. Cancellations are recorded in the period received from the customer and historically have not been material.

	Year Ended October 31,			2019 over 2018 % Change	2018 over 2017 % Change
	2019	2018	2017		
	(in millions)				
Net revenue:					
Products	\$3,554	\$3,229	\$2,664	10%	21%
Services and other	749	649	525	15%	24%
Total net revenue	<u>\$4,303</u>	<u>\$3,878</u>	<u>\$3,189</u>	11%	22%

	Year Ended October 31,			2019 over 2018 % Change	2018 over 2017 % Change
	2019	2018	2017		
% of total net revenue:					
Products	83%	83%	84%	—	(1) ppt
Services and other	17%	17%	16%	—	1 ppt
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>		

The following table provides the percent change in revenue for the years ended October 31, 2019 and 2018 by geographic region, including and excluding the impact of foreign currency movements, as compared to the respective prior year.

Geographic Region	Year over Year % Change			
	2019 over 2018		2018 over 2017	
	actual	currency adjusted	actual	currency adjusted
Americas	12%	12%	28%	28%
Europe	(2)%	1%	29%	25%
Asia Pacific	16%	17%	13%	12%
Total revenue	11%	12%	22%	20%

Net revenue for the year ended October 31, 2019 was \$4,303 million, an increase of 11 percent when compared to 2018. Foreign currency movements had an unfavorable impact of 1 percentage point on the year-over-year comparison. Revenue associated with acquisitions and divestitures had a net neutral impact on revenue growth for the year ended October 31, 2019 when compared to 2018. Currency had an unfavorable impact of 3 percentage points and 1 percentage point on revenue growth in Europe and Asia Pacific, respectively, for the year ended October 31, 2019.

Net revenue for the year ended October 31, 2018 was \$3,878 million, an increase of 22 percent when compared to 2017. Foreign currency movements had a favorable impact of 2 percentage points on the year-over-year comparison. Revenue associated with acquisitions accounted for 6 percentage points of revenue growth for the year ended October 31, 2018 when compared to 2017. Currency had a favorable impact of 4 percentage points and 1 percentage point on revenue growth in Europe and Asia Pacific, respectively, for the year ended October 31, 2018.

Backlog

Backlog represents the amount of revenue expected from orders that have already been booked, including orders for goods and services that have not been delivered to customers, orders invoiced but not yet recognized as revenue, and orders for goods that were shipped but not invoiced, awaiting acceptance by customers and/or completion of a commitment to a customer.

At October 31, 2019, our unfilled backlog was approximately \$1,380 million as compared to approximately \$1,311 million at October 31, 2018. Our unfilled backlog as of October 31, 2019 reflects the impact of the deferred revenue adjustment related to the adoption of *Accounting Standards Update 2014-09, Revenue From Contracts With Customers* (“ASC 606”). See Note 2, “New Accounting Pronouncements,” for additional information. Consistent with our strategy, we are seeing an increase in solution sales, which have a longer order-to-revenue conversion cycle; however, we expect that the majority of unfilled backlog will be recognized as revenue within six months. While backlog on any particular date can be an indicator of short-term revenue performance, it is not necessarily a reliable indicator of medium or long-term revenue performance.

Costs and Expenses

	Year Ended October 31,			2019 over 2018	2018 over 2017
	2019	2018	2017	% Change	% Change
Gross margin on products	59.5%	55.1%	54.6%	4 ppts	—
Gross margin on services and other	56.0%	51.1%	46.3%	5 ppts	5 ppts
Total gross margin	58.9%	54.4%	53.2%	5 ppts	1 ppt
Operating margin	16.5%	(10.2)%	4.6%	27 ppts	(15) ppts

(in millions)

Research and development	\$688	\$624	\$507	10%	23%
Selling, general and administrative	\$1,155	\$1,205	\$1,058	(4)%	14%
Goodwill impairment	\$—	\$709	\$—	—	—
Other operating expense (income), net	\$(20)	\$(33)	\$(16)	(40)%	105%

Gross margin increased 5 percentage points in 2019 compared to 2018, primarily driven by higher revenue volume, highly differentiated solutions, favorable mix and a decline in warranty costs. Gross margin increased 1 percentage point in 2018 compared to 2017, primarily driven by gains related to revenue volume and favorable mix, partially offset by increases in variable people-related costs and amortization of acquisition-related balances.

Excess and obsolete inventory charges were \$27 million in 2019, \$25 million in 2018 and \$16 million in 2017. Sales of previously written-down inventory were \$2 million in 2019, \$2 million in 2018 and \$1 million in 2017.

Research and development expense increased 10 percent in 2019 compared to 2018, primarily driven by greater investment in key growth opportunities in our end markets, leading-edge technologies, people and infrastructure. Research and development expense increased 23 percent in 2018 compared to 2017, primarily driven by the addition of acquired companies to our cost structure, an increase in variable people-related costs and our continued investment in research and development programs, partially offset by non-recurring acquisition-related compensation expense in 2017. Research and development expenses as a percent of total revenue were 16 percent in each of the three years 2019, 2018 and 2017.

Selling, general and administrative expenses decreased 4 percent in 2019 compared to 2018, primarily driven by a decline in litigation and restructuring costs and acquisition and integration costs, partially offset by an increase in people-related costs. Selling, general and administrative expenses increased 14 percent for 2018 compared to 2017, primarily driven by the addition of acquired companies to our cost structure and increases in variable people-related, litigation and restructuring costs, partially offset by the elimination of non-recurring acquisition-related compensation expense, separation and related costs, acquisition and integration costs and the unfavorable impact from northern California wildfire-related costs.

In 2018 we recorded a goodwill impairment charge of \$709 million for the Ixia Solutions Group based on the results of our annual impairment test of goodwill. See Note 11, “Goodwill and Other Intangible Assets,” to our consolidated financial statements for additional information.

Other operating expense (income), net primarily includes property rental income and was income of \$20 million, \$33 million and \$16 million for 2019, 2018 and 2017, respectively. Other operating expense (income), net for 2018 also includes income from business divestitures.

Operating margin increased 27 percentage points in 2019 when compared to 2018, primarily driven by a non-recurring goodwill impairment charge in 2018, higher revenue volume, highly differentiated solutions, favorable mix, lower acquisition and integration costs, and lower litigation and restructuring-related costs, partially offset by an increase in people-related costs. Operating margin decreased 15 percentage points in 2018 when compared to 2017, primarily driven by goodwill impairment and an increase in variable people-related costs, partially offset by gains related to revenue volume and favorable mix.

Our headcount was approximately 13,600 at October 31, 2019 compared to 12,900 at October 31, 2018.

Interest Income and Expense

Interest income for the years ended October 31, 2019, 2018 and 2017 was \$23 million, \$12 million and \$7 million, respectively, and primarily relates to interest earned on our cash balances. Interest expense for the years ended October 31, 2019, 2018 and 2017 was \$80 million, \$83 million and \$80 million, respectively, and primarily relates to interest on our senior notes.

Other income (expense), net

Other income (expense), net for the years ended October 31, 2019, 2018 and 2017 was income of \$61 million, \$54 million and \$104 million, respectively, and primarily includes income related to our defined benefit and post-retirement benefit plans (interest cost, expected return on assets and amortization of net actuarial loss and prior service credits) and the change in fair value of our equity investments. Other income for 2017 also includes a \$68 million gain from a settlement related to our Japan pension fund.

Income Taxes

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Provision (benefit) for income taxes.....	\$94	\$(576)	\$77

For 2019, the effective tax rate was 13 percent, which is lower than the U.S. statutory rate primarily due to a higher percentage of earnings in the non-U.S. jurisdictions taxed at lower statutory tax rates.

For 2018, the effective tax rate was 140 percent, which is higher than the U.S. statutory rate primarily due to the net impact of U.S. tax law changes, the Singapore restructuring and tax incentive modifications completed in 2018 in response to Singapore tax law changes, and the tax impact of goodwill impairment.

For 2017, the effective tax rate was 43 percent, which is higher than the U.S. statutory rate primarily due to the payment of a prior year Malaysia tax assessment of \$68 million, including tax and penalties, which we are currently in the process of appealing to the Special Commissioners of Income Tax (“SCIT”) in Malaysia.

We benefit from tax incentives in several different jurisdictions, most significantly in Singapore, that have granted tax incentives that require renewal at various times in the future. The tax incentives provide lower rates of taxation on certain classes of income and require various thresholds of investment and employment or specific types

of income in those jurisdictions. The tax incentives are due for renewal between 2024 and 2025. The impact of the tax incentives decreased income taxes by \$47 million, \$567 million and \$49 million in 2019, 2018 and 2017, respectively. The decrease in the tax benefit from 2018 to 2019 is primarily due to the one-time impacts of the Singapore restructuring and tax incentive modifications that were completed in 2018 in response to Singapore tax law changes.

The calculation of our tax liabilities involves uncertainties in the application of complex tax law and regulations in a multitude of jurisdictions. Although the guidance on the accounting for uncertainty in income taxes prescribes the use of a recognition and measurement model, the determination of whether an uncertain tax position has met those thresholds will continue to require significant judgment by management. In accordance with the guidance on the accounting for uncertainty in income taxes, for all U.S. and other tax jurisdictions, we recognize potential liabilities for anticipated tax audit issues based on our estimate of whether, and the extent to which, additional taxes and interest will be due. The ultimate resolution of tax uncertainties may differ from what is currently estimated, which could result in a material impact on income tax expense. If our estimate of income tax liabilities proves to be less than the ultimate assessment, a further charge to expense would be required. If the payment of these additional amounts ultimately proves to be unnecessary, the reversal of the liabilities would result in tax benefits being recognized in the period when we determine the liabilities are no longer necessary. We include interest and penalties related to unrecognized tax benefits within the provision for income taxes in the consolidated statements of operations. Accrued interest and penalties are included on the related tax liability line in the consolidated balance sheet.

The open tax years for the IRS and most states are from November 1, 2015 through the current tax year. For the majority of our foreign entities, the open tax years are from November 1, 2014 through the current tax year. For certain foreign entities, the tax years remain open, at most, back to 2008. Given the number of years and numerous matters that remain subject to examination in various tax jurisdictions, we are unable to estimate the range of possible changes to the balance of our unrecognized tax benefits.

The company is being audited in Malaysia for the 2008 tax year. Although this tax year pre-dates our separation from Agilent, pursuant to the agreement between Agilent and Keysight pertaining to tax matters, as finalized at the time of separation, for certain entities, including Malaysia, any historical tax liability is the responsibility of Keysight. In the fourth quarter of fiscal 2017, Keysight paid income taxes and penalties of \$68 million on gains related to intellectual property rights, although we are currently in the process of appealing to the SCIT in Malaysia. The company believes there are numerous defenses to the current assessment; the statute of limitations for the 2008 tax year in Malaysia was closed, and the income in question is exempt from tax in Malaysia. The company is disputing this assessment and pursuing all avenues to resolve this issue favorably for the company.

Segment Overview

In 2019 we completed an organizational change to align our services business with our customer-solutions-oriented, go-to-market strategy as reflected by our Keysight Leadership Model (“KLM”). This change was made to fully reflect our services delivery within the markets served and further enable the growth of our services solutions portfolio. Prior period segment results were revised to conform to the presentation. As a result, Keysight has three segments: Communications Solutions Group, Electronic Industrial Solutions Group and Ixia Solutions Group. The organizational structure continues to include centralized enterprise functions that provide support across the groups. The Communications Solutions Group provides electronic design and test software, instruments, systems, services and solutions that span both the global commercial communications and aerospace, defense and government end markets. The Electronic Industrial Solutions Group provides electronic design and test software, instruments, systems, services and solutions across a broad range of electronic industrial end markets, which include automotive and energy, semiconductor, general electronics and education markets. The Ixia Solutions Group provides network testing, visibility and security solutions, strengthening applications across physical and virtual networks for enterprises, service providers, network equipment manufacturers and governments.

The profitability of each of the segments is measured after excluding share-based compensation expense, restructuring and related costs, amortization of acquisition-related balances, acquisition and integration costs, acquisition-related compensation expense, separation and related costs, pension curtailment and settlement loss (gain), northern California wildfire-related costs, goodwill impairment, legal settlement, gain on divestitures, interest income, interest expense and other items.

Communications Solutions Group

The Communications Solutions Group serves customers spanning the worldwide commercial communications and aerospace, defense and government end markets. The group provides electronic design and test software, instruments, systems and related services used in the simulation, design, validation, manufacturing, installation and optimization of electronic equipment.

Net Revenue

	Year Ended October 31,			2019 over 2018 % Change	2018 over 2017 % Change
	2019	2018	2017		
	(in millions)				
Total net revenue	\$2,688	\$2,392	\$2,064	12%	16%

The Communications Solutions Group's revenue in 2019 increased 12 percent when compared to 2018, primarily driven by strong growth in the commercial communications market, while the aerospace, defense and government market was flat. Revenue growth in the Asia Pacific and the Americas was partially offset by a decline in Europe. The Communications Solutions Group's revenue in 2018 increased 16 percent when compared to 2017, primarily driven by strong growth in the commercial communications and the aerospace, defense and government markets. Revenue grew across all geographies and all markets.

Revenue from the commercial communications market represented approximately 64 percent of total Communications Solutions Group revenue in 2019 and increased 21 percent year over year, with growth across all geographies. This revenue growth was primarily driven by increased 5G investment across the wireless ecosystem and growth in data-center-related next-generation 400 gigabit Ethernet and higher digital test. Revenue from the commercial communications market represented approximately 59 percent of total Communications Solutions Group revenue in 2018 and increased 17 percent compared to 2017, growing across all geographies. In 2018 the revenue growth was primarily driven by growth in our 5G-related solutions across the wireless ecosystem, with strong demand for network access applications and steady investments in the network and data center markets.

Revenue from the aerospace, defense and government market represented approximately 36 percent of total Communications Solutions Group revenue in 2019 and was flat when compared to 2018. In 2019 revenue grew in the Americas and Asia Pacific, partially offset by a decline in Europe. Revenue from the aerospace, defense and government market represented approximately 41 percent of total Communications Solutions Group revenue in 2018 and increased 15 percent compared to 2017, growing across all geographies. The growth was primarily driven by higher global defense spending and overall improvement in the global economy.

Gross Margin and Operating Margin

The following table provides Communications Solutions Group margins, expenses and income from operations for 2019 versus 2018, and 2018 versus 2017.

	Year Ended October 31,			2019 over 2018 % Change	2018 over 2017 % Change
	2019	2018	2017		
Total gross margin	62.6%	58.5%	58.1%	4 ppts	—
Operating margin	26.6%	19.8%	16.8%	7 ppts	3 ppts
(in millions)					
Research and development	\$385	\$345	\$310	12%	11%
Selling, general and administrative	\$592	\$590	\$551	—	7%
Other operating expense (income), net	\$(9)	\$(9)	\$(9)	(3)%	5%
Income from operations	\$714	\$474	\$347	51%	36%

Gross margin for the Communications Solutions Group in 2019 increased 4 percentage points compared to 2018, primarily driven by higher revenue volume, highly differentiated solutions, favorable mix, and lower warranty costs. Gross margin for the Communications Solutions Group in 2018 was flat compared to 2017, as gains from higher revenue volume were offset by an increase in people-related costs.

Research and development expense in 2019 and 2018 increased 12 percent and 11 percent, respectively when compared to 2018 and 2017, primarily driven by greater investment in key growth opportunities in our end markets, leading-edge technologies, people and infrastructure.

Selling, general and administrative expense in 2019 was flat when compared to 2018, as higher marketing-related investments were offset by declines in selling costs and infrastructure-related costs. Selling, general and administrative expense in 2018 increased 7 percent when compared to 2017, primarily driven by higher infrastructure-related costs, variable people-related costs and investment in sales resources.

Other operating expense (income), net primarily includes property rental income and was income of \$9 million in 2019, 2018 and 2017.

Income from Operations

Income from operations for 2019 increased \$240 million on corresponding revenue growth of \$296 million. Income from operations for 2018 increased \$127 million on corresponding revenue growth of \$328 million.

Operating margin in 2019 increased 7 percentage points when compared to 2018 driven by higher revenue volume, highly differentiated solutions and favorable mix, while selling, general and administrative expense was flat. Operating margin in 2018 increased 3 percentage points when compared to 2017 as gains from revenue growth were partially offset by increases in variable people-related costs, infrastructure-related costs and investments in sales resources.

Electronic Industrial Solutions Group

The Electronic Industrial Solutions Group provides test and measurement solutions and related services across a broad set of electronic industrial end markets, focusing on high-value applications in the automotive and energy industry and measurement solutions for consumer electronics, education, general electronics design and manufacturing, and semiconductor design and manufacturing. The group provides electronic design and test software, instruments and systems and related services used in the simulation, design, validation, manufacturing, installation and optimization of electronic equipment.

Net Revenue

	Year Ended October 31,			2019 over	2018 over
	2019	2018	2017	2018 %	2017 %
	(in millions)			Change	Change
Total net revenue	<u>\$1,135</u>	<u>\$1,071</u>	<u>\$929</u>	6%	15%

The Electronic Industrial Solutions Group's revenue in 2019 increased 6 percent when compared to 2018, driven by strong growth in general electronics solutions and automotive and energy, while semiconductor measurement solutions remained flat when compared to 2018. Revenue grew across all regions. The Electronic Industrial Solutions Group's revenue in 2018 increased 15 percent when compared to 2017, driven by strong growth in general electronics, automotive and energy and semiconductor solutions. Revenue associated with acquisitions accounted for 3 percentage points of revenue growth for the year ended October 31, 2018 when compared to 2017. Revenue grew across all regions.

Gross Margin and Operating Margin

The following table provides Electronic Industrial Solutions Group margins, expenses and income from operations for 2019 versus 2018, and 2018 versus 2017.

	Year Ended October 31,			2019 over	2018 over
	2019	2018	2017	2018 % Change	2017 % Change
Total gross margin.....	61.1%	58.9%	59.0%	2ppts	—
Operating margin.....	25.9%	22.9%	22.5%	3ppts	—
(in millions)					
Research and development	\$159	\$145	\$123	10 %	17%
Selling, general and administrative.....	\$244	\$245	\$219	—	11%
Other operating expense (income), net.....	\$ (4)	\$ (4)	\$ (4)	(11)%	5%
Income from operations	\$294	\$245	\$209	20 %	18%

Gross margin in 2019 increased 2 percentage points as compared to 2018, primarily driven by higher revenue volume, highly differentiated solutions, favorable mix and lower warranty costs. Gross margin in 2018 was flat when compared to 2017 as gains from higher revenue were offset by unfavorable revenue mix.

Research and development expense in 2019 increased 10 percent when compared to 2018, primarily driven by continued investments in key growth opportunities in our end markets, leading-edge technologies and infrastructure. Research and development expense in 2018 increased 17 percent when compared to 2017, primarily driven by increased investments in key growth opportunities in our end markets and leading-edge technologies, the addition of an acquired company and higher variable people-related costs.

Selling, general and administrative expense in 2019 was flat when compared to 2018, primarily driven by increases in marketing-related investments and selling costs, offset by a decrease in infrastructure-related costs. Selling, general and administrative expense in 2018 increased 11 percent when compared to 2017, primarily driven by the addition of an acquired company and higher infrastructure-related costs, investments in sales resources and variable people-related costs.

Other operating expense (income), net primarily includes property rental income and was income of \$4 million in 2019, 2018 and 2017.

Income from Operations

Income from operations for 2019 increased \$49 million on corresponding revenue growth of \$64 million. Income from operations for 2018 increased \$36 million on corresponding revenue growth of \$142 million.

Operating margin increased 3 percentage points in 2019 compared to 2018, driven by higher revenue volume, highly differentiated solutions and favorable mix, while the selling general and administrative expenses remained flat. Operating margin was flat in 2018 compared to 2017 as gains from higher revenue were offset by increases in infrastructure-related costs, investments in sales resources and variable people-related costs.

Ixia Solutions Group

The Ixia Solutions Group helps customers design, validate and optimize the performance and security resilience of their networks and associated components and applications both pre and post go live. Network test, network visibility and security solutions help organizations and their customers strengthen their physical and virtual networks. The group's solutions consist of software applications and services, including warranty and maintenance offerings, and high-performance hardware platforms.

Net Revenue

	Year Ended October 31,			2019 over	2018 over
	2019	2018	2017	2018 % Change	2017 % Change
(in millions)					
Total net revenue.....	<u>\$489</u>	<u>\$451</u>	<u>\$256</u>	9%	n/a

The Ixia Solutions Group's revenue in 2019 increased 9 percent when compared to 2018, driven by strong growth in both visibility network and network test solutions. Revenue growth in Asia Pacific and the Americas was partially offset by a decline in Europe. The Ixia Solutions Group's operating results in 2019 and 2018 are not comparable with 2017, which only includes activity from the date of acquisition, April 18, 2017, through October 31, 2017.

The following table provides Ixia Solutions Group margins, expenses and income from operations for 2019 versus 2018, and 2018 versus 2017. The Ixia Solutions Group's operating results in 2019 and 2018 are not comparable with 2017, which only includes activity from the date of acquisition.

	<u>Years Ended October 31,</u>			<u>2019 over</u>	<u>2018 over</u>
	<u>2019</u>	<u>2018</u>	<u>2017</u>	<u>% Change</u>	<u>% Change</u>
Total gross margin.....	71.7%	74.2%	76.5%	(3) ppts	n/a
Operating margin.....	5.9%	3.6%	16.3%	2 ppts	n/a
(in millions)					
Research and development.....	\$126	\$119	\$51	6%	n/a
Selling, general and administrative.....	\$198	\$199	\$103	—	n/a
Other operating expense (income), net.....	\$(2)	\$—	\$—	—	n/a
Income from operations.....	\$29	\$16	\$42	75%	n/a

Gross margin in 2019 decreased 3 percentage points as compared to 2018, primarily due to a higher allocation of company infrastructure-related costs after integration.

Research and development expense in 2019 increased 6 percent when compared to 2018, primarily driven by higher people-related costs and continued investments in leading-edge technologies and key growth opportunities in our end markets.

Selling, general and administrative expense in 2019 was flat when compared to 2018, primarily driven by declines in selling and marketing-related costs and synergies derived from integration, offset by an increase in infrastructure-related costs.

Other operating expense (income), net primarily includes property rental income and was income of \$2 million in 2019 and zero in both 2018 and 2017.

Income from Operations

Income from operations for 2019 increased \$13 million on a corresponding revenue increase of \$38 million.

Operating margin increased 2 percentage points in 2019 compared to 2018, driven by higher revenue volume and cost synergies resulting from integration, partially offset by higher allocation of company infrastructure-related costs after integration.

Financial Condition

Liquidity and Capital Resources

Our financial position as of October 31, 2019 consisted of cash, cash equivalents and restricted cash of \$1,600 million as compared to \$917 million as of October 31, 2018.

As of October 31, 2019, approximately \$1,108 million of our cash, cash equivalents and restricted cash was held outside of the U.S. in our foreign subsidiaries. Our cash and cash equivalents mainly consist of short-term deposits held at major global financial institutions, investments in institutional money market funds, and similar short duration instruments with original maturities of 90 days or less. We continuously monitor the creditworthiness of the financial institutions in which we invest our funds. We utilize a variety of funding strategies in an effort to ensure that our worldwide cash is available in the locations in which it is needed. Most significant international locations have access to internal funding through an offshore cash pool for working capital needs. In addition, a few locations that are unable to access internal funding have access to temporary local overdraft and short-term working capital lines of credit.

We believe our cash and cash equivalents, cash generated from operations, and ability to access capital markets and credit lines will satisfy, for at least the next twelve months, our liquidity requirements, both globally and domestically, including the following: working capital needs, capital expenditures, business acquisitions, contractual obligations, commitments, principal and interest payments on debt, and other liquidity requirements associated with our operations.

Net Cash Provided by Operating Activities

Cash flows from operating activities can fluctuate significantly from period to period as working capital needs and the timing of payments for income taxes, restructuring activities, pension funding, variable pay and other items impact reported cash flows.

Net cash provided by operating activities was \$998 million for the year ended October 31, 2019 as compared to \$555 million provided in 2018 and \$328 million provided in 2017.

- Net income in 2019 increased by \$456 million as compared to 2018. Non-cash adjustments in 2019 increased \$102 million compared to 2018, driven by a \$787 million decrease in the adjustment for deferred tax benefits due to the 2018 impact of U.S. and Singapore tax law changes and the tax impact of goodwill impairment, a \$23 million increase in share-based compensation expense, a \$19 million reduction in the gain on sales of assets and divestitures and a \$5 million increase in amortization expense, partially offset by a \$709 million reduction in the goodwill impairment, a \$7 million decrease in depreciation expense and a \$16 million decrease from other miscellaneous non-cash activities.

Net income in 2018 increased by \$63 million as compared to 2017. Non-cash adjustments in 2018 increased \$111 million compared to 2017 due to a \$709 million goodwill impairment, a \$74 million increase in amortization expense, a \$70 million increase from a prior-period pension curtailment and settlement gain, an \$11 million increase in depreciation expense and \$1 million from other miscellaneous non-cash activities, partially offset by a \$742 million increase in the adjustment for deferred tax benefits due to the 2018 impact of U.S. and Singapore tax law changes and the tax impact of goodwill impairment, and a \$12 million gain on the sale of assets and divestitures.

- The aggregate of accounts receivable, inventory and accounts payable used net cash of \$105 million during 2019, compared to net cash used of \$128 million in 2018 and zero in 2017. The amount of cash flow generated from or used by the aggregate of accounts receivable, inventory and accounts payable depends on the cash conversion cycle, which represents the number of days that elapse from the day we pay for the purchase of raw materials and components to the collection of cash from our customers and can be significantly impacted by the timing of shipments and purchases, as well as collections and payments in a period.
- The aggregate of employee compensation and benefits, income taxes payable, deferred revenue, and other assets and liabilities provided net operating cash of \$107 million during 2019 as compared to net cash provided of \$335 million and \$42 million in 2018 and 2017, respectively. The difference between 2019 and 2018 activities is primarily driven by an increase in income taxes payable due to the establishment of a long-term transition tax liability resulting from new U.S. tax legislation that was enacted in 2018 and higher variable compensation payments, partially offset by lower cash outflow for fire-related recovery. In 2019 and 2018, we received insurance proceeds of \$37 million and \$94 million, respectively, associated with recovery from the northern California wildfires and a 2016 Singapore warehouse fire.
- Net cash used for retirement and post-retirement benefits was \$37 million, \$127 million and \$15 million in 2019, 2018 and 2017, respectively. In 2019 we made no contributions to our U.S. Defined Benefit Plans as compared to an accelerated contribution of \$85 million in 2018 to secure tax deductibility prior to new tax legislation taking effect and no contributions in 2017. We contributed \$26 million to our non-U.S. defined benefit plans during 2019 compared to \$33 million in 2018 and \$34 million in 2017. We did not contribute to the U.S. Post-Retirement Benefit Plan in 2019, 2018 and 2017.

Net Cash Used in Investing Activities

Net cash used in investing activities was \$196 million, \$108 million and \$1,722 million in 2019, 2018 and 2017, respectively. Investments in property, plant and equipment were \$120 million, \$132 million and \$72 million in 2019, 2018 and 2017, respectively. Capital spending in 2019 and 2018 includes \$7 million and \$27 million, respectively, related to recovery from the northern California wildfires.

In 2019 we paid \$88 million, net of \$56 million of cash acquired, for the acquisition of Prisma Telecom Testing, a global provider of radio access network test solutions. We also received \$7 million of proceeds from the sale of investments and \$2 million from divestitures. In 2018 we paid \$5 million for acquisitions and received proceeds of \$29 million from divestitures. In 2017 we paid \$1,622 million, net of \$72 million of cash acquired, for the acquisition of Ixia, \$60 million, net of \$2 million of cash acquired for the acquisition of ScienLab, and \$20 million, net, for other acquisition activity. We also received \$8 million of proceeds from the sale of land and \$45 million of proceeds from the sale of investments in 2017.

Net Cash Used in Financing Activities

Net cash used in financing activities was \$122 million in 2019 compared to \$341 million used in 2018 and \$1,425 million provided in 2017.

In 2019 we used net cash of \$122 million, primarily for a \$500 million repayment of short-term debt, \$159 million for treasury stock purchases and \$26 million of tax payments related to net share settlement of equity awards, partially offset by proceeds from issuance of long-term debt of \$496 million, net of issuance costs, and \$67 million from issuance of common stock under employee stock plans.

On May 29, 2019, the Board of Directors approved a new stock repurchase program authorizing the purchase of up to \$500 million of the company's common stock, replacing a previously approved 2018 program authorizing the purchase of up to \$350 million of the company's common stock. The stock repurchase program may be commenced, suspended or discontinued at any time at the company's discretion and does not have an expiration date. See "Issuer Purchases of Equity Securities" under Item 5 for additional information.

In 2018 we used \$341 million for financing activities, primarily for a \$260 million repayment of term loan borrowings, \$120 million for treasury stock purchases, \$18 million of tax payments related to net share settlement of equity awards and \$6 million for acquisition-related contingent consideration, partially offset by proceeds of \$64 million from issuance of common stock under employee stock plans.

In 2017 net cash provided by financing activities was \$1,425 million primarily due to proceeds used to fund the acquisition of Ixia, including the issuance of long-term debt of \$1,069 million, short-term borrowings of \$212 million, and the issuance of common stock under public offering of \$444 million, net of issuance costs. We repaid \$323 million of the borrowings in 2017, including \$182 million of the revolving facility, \$140 million of the term loan and a \$1 million short-term loan acquired with the acquisition of ScienLab. In addition, during 2017, we issued common stock under employee stock plans of \$51 million and made \$12 million of tax payments related to net share settlement of equity awards.

Short-term debt

Revolving Credit Facility

On February 15, 2017, we entered into an amended and restated credit agreement (the "Revolving Credit Facility") that replaced our existing \$450 million unsecured credit facility dated September 15, 2014. The Revolving Credit Facility provides for a \$450 million, five-year unsecured revolving credit facility that will expire on February 15, 2022 and bears interest at an annual rate of LIBOR + 1.10%. In addition, the Revolving Credit Facility permits us to increase the total commitments under this credit facility by up to \$150 million in the aggregate on one or more occasions upon request. We may use amounts borrowed under the facility for general corporate purposes. As of October 31, 2019, we had no borrowings outstanding under the Revolving Credit Facility. We were in compliance with the covenants of the Revolving Credit Facility during the year ended October 31, 2019. During fiscal 2018, we borrowed and repaid \$40 million under the Revolving Credit Facility.

Bridge Facility

On January 30, 2017, we entered into a commitment letter, pursuant to which certain lenders agreed to provide a senior unsecured 364-day bridge loan facility of up to \$1.684 billion ("the Bridge Facility") for the purpose of providing the financing to support Keysight's acquisition of Ixia. Under the terms of the commitment letter, the Bridge Facility was automatically terminated upon the acquisition of Ixia on April 18, 2017. For the year ended October 31, 2017, we incurred costs in connection with the Bridge Facility of \$9 million that were amortized to interest expense.

2019 Senior Notes

In October 2014, the company issued an aggregate principal amount of \$500 million in senior notes (“2019 Senior Notes”). These notes matured on October 30, 2019, and were fully repaid.

Long-term debt

The below senior notes are unsecured and rank equally in right of payment with all of our other senior unsecured indebtedness.

2024 Senior Notes

In October 2014, the company issued an aggregate principal amount of \$600 million in senior notes (“2024 Senior Notes”). The 2024 Senior Notes were issued at 99.966 percent of their principal amount. The notes will mature on October 30, 2024, and bear interest at a fixed rate of 4.55 percent per annum. The interest is payable semi-annually on April 30 and October 30 of each year.

2027 Senior Notes

In April 2017, the company issued an aggregate principal amount of \$700 million in senior notes (“2027 Senior Notes”). The 2027 Senior Notes were issued at 99.873 percent of their principal amount. The notes will mature on April 6, 2027 and bear interest at a fixed rate of 4.60 percent per annum. The interest is payable semi-annually on April 6 and October 6 of each year, commencing on October 6, 2017. We incurred issuance costs of \$6 million in connection with the 2027 Senior Notes that, along with the debt discount, are being amortized to interest expense over the term of the senior notes.

2029 Senior Notes

In October 2019, the company issued an aggregate principal amount of \$500 million in unsecured senior notes (“2029 Senior Notes”). The 2029 Senior Notes were issued at 99.914 percent of their principal amount. The notes will mature on October 30, 2029 and bear interest at a fixed rate of 3.00 percent per annum. The interest is payable semi-annually on April 30 and October 30 of each year, commencing on April 30, 2020. We incurred issuance costs of \$4 million in connection with the 2029 Senior Notes that, along with the debt discount, are being amortized to interest expense over the term of the senior notes.

Senior Unsecured Term Loan

On February 15, 2017, we entered into a term credit agreement that provided for a three-year \$400 million senior unsecured term loan that bore interest at an annual rate of LIBOR + 1.50%. The term loan was drawn upon the closing of the Ixia acquisition. On February 27, 2018, we fully repaid the borrowings outstanding under the term loan of \$260 million and terminated the term credit agreement. We had previously repaid \$140 million of the term loan during the year ended October 31, 2017.

Off Balance Sheet Arrangements and Other

We have contractual commitments for non-cancellable operating leases. See Note 17, “Commitments and Contingencies,” to our consolidated financial statements for further information on our non-cancellable operating leases.

Our liquidity is affected by many factors, some of which are based on normal ongoing operations of our business and some of which arise from fluctuations related to global economics and markets. Our cash balances are generated and held in many locations throughout the world. Local government regulations may restrict our ability to move cash balances to meet cash needs under certain circumstances. We do not currently expect such regulations and restrictions to impact our ability to pay vendors and conduct operations throughout our global organization.

Contractual Commitments

Our cash flows from operations are dependent on a number of factors, including fluctuations in our operating results, accounts receivable collections, inventory management, and the timing of tax and other payments. As a result, the impact of contractual obligations on our liquidity and capital resources in future periods should be analyzed in conjunction with such factors.

The following table summarizes our total contractual obligations at October 31, 2019. The amounts presented in the table do not reflect \$130 million of liabilities for uncertain tax positions as of October 31, 2019. We are unable to accurately predict when these amounts will be realized or released. However, it is reasonably possible that there could be significant changes to our unrecognized tax benefits in the next 12 months due to either the expiration of a statute of limitations or a tax audit settlement.

	<u>Total</u>	<u>Less than one year</u>	<u>One to three years</u>	<u>Three to five years</u>	<u>More than five years</u>
			(in millions)		
Senior notes obligations	\$1,800	\$ —	\$ —	\$600	\$1,200
Interest payments on senior notes.	526	75	149	149	153
Operating lease commitments	196	48	71	31	46
Capital lease commitments	4	—	1	2	1
Commitments to contract manufacturers and suppliers	410	408	2	—	—
Retirement plans	11	11	—	—	—
US transition tax liability	68	—	9	20	39
Other purchase commitments	69	69	—	—	—
Total	<u>\$3,084</u>	<u>\$611</u>	<u>\$232</u>	<u>\$802</u>	<u>\$1,439</u>

Interest on senior notes. We have contractual obligations for interest payments on our senior notes. Interest rates and payment dates are detailed above under “Short-term debt” and “Long-term debt”.

Operating leases. Commitments under operating leases relate primarily to leasehold property. See Note 17, “Commitments and Contingencies.”

Commitments to contract manufacturers and suppliers. We purchase components from a variety of suppliers and use several contract manufacturers to provide manufacturing services for our products. During the normal course of business, we issue purchase orders with estimates of our requirements several months ahead of the delivery dates. The reported purchase commitments represent the commitments under open purchase orders with our suppliers that have not been received. However, our agreements with these suppliers usually provide us with the option to cancel, reschedule, and adjust our requirements based on business needs prior to firm orders being placed. We expect to fulfill most of our purchase commitments for inventory within one year.

In addition to the commitments to contract manufacturers and suppliers referenced above, we record a liability for firm, non-cancellable and unconditional purchase commitments for quantities in excess of our future demand forecasts consistent with our policy relating to excess inventory. As of October 31, 2019, the liability for our excess firm, non-cancellable and unconditional purchase commitments was \$21 million, compared to \$17 million as of October 31, 2018. These amounts are included in other accrued liabilities in our consolidated balance sheet.

Retirement plans. Commitments under the retirement plans relate to expected contributions to be made to our non-U.S. defined benefit plans for the next year only. Contributions beyond the next year are impractical to estimate.

We also have benefit payments due under our defined benefit retirement plans and post-retirement benefit plan that are not required to be funded in advance, but are paid in the same period that benefits are provided. See Item 8-Financial Statements and Supplementary Data, Note 15, “Retirement Plans and Post-Retirement Benefit Plans,” for additional information.

U.S. transition tax liability. The obligation for the U.S. transition tax liability relates to the one-time U.S. tax on those earnings which have not previously been repatriated to the U.S. (the “Transition Tax”). Keysight has elected to pay the Transition Tax over 8 years. See Item 7. Management’s Discussion and Analysis, “Income Taxes,” for additional information on the Transition Tax.

Other purchase commitments. Other purchase commitments relate to contracts with professional services suppliers. We can typically cancel these contracts within 90 days without penalties. For those contracts that are not cancellable within 90 days without penalties, we disclose the amounts we are obligated to pay to a supplier under each contract in that period before such contract can be canceled. As of October 31, 2019, our contractual obligations with these suppliers was approximately \$69 million within the next fiscal year, as compared to approximately \$59 million as of October 31, 2018.

We had no material off-balance sheet arrangements as of October 31, 2019 or October 31, 2018.

Critical Accounting Policies and Estimates

The preparation of financial statements in accordance with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the amounts reported in our consolidated financial statements and accompanying notes. Management bases its estimates on historical experience and various other assumptions believed to be reasonable. Although these estimates are based on management's best knowledge of current events and actions that may impact the company in the future, actual results may be different from the estimates. An accounting policy is deemed to be critical if it requires an accounting estimate to be made based on assumptions about matters that are highly uncertain at the time the estimate is made, and if different estimates that reasonably could have been used or changes in the accounting estimate that are reasonably likely to occur could materially change the financial statements. Our critical accounting policies are those that affect our financial statements materially and involve difficult, subjective or complex judgments by management. Those policies are revenue recognition, inventory valuation, share-based compensation, retirement and post-retirement plan assumptions, valuation of goodwill and other intangible assets, warranty, loss contingencies, restructuring and accounting for income taxes.

Revenue recognition. In May 2014, the Financial Accounting Standards Board issued Accounting Standard Update 2014-09, *Revenue from Contracts with Customers*, which became effective for us beginning November 1, 2018. For additional information on the new revenue recognition guidance and the impact of adoption, see Note 1, "Overview, Basis of Presentation and Summary of Significant Accounting Policies," Note 2, "New Accounting Pronouncements," and Note 4, "Revenue" to the consolidated financial statements.

Revenue is recognized upon transfer of control of the promised products or services to customers in an amount that reflects the consideration we expect to receive in exchange for those products or services. We primarily generate revenue from the sale of products (hardware and/or software), services, or a combination thereof. We enter into contracts that may involve multiple performance obligations, and we allocate the transaction price between each performance obligation on the basis of relative standalone selling price ("SSP"). We recognize revenue following the five-step model.

1. *Identify the contract with a customer:* Generally, we consider customer purchase orders which, in some cases are governed by master sales or other purchase agreements, to be the customer contract. All of the following criteria must be met before we consider an agreement to qualify as a contract with a customer under the revenue standard: (i) it must be approved by all parties; (ii) each party's rights regarding the goods and services to be transferred can be identified; (iii) the payment terms for the goods and services can be identified; (iv) the agreement has commercial substance; and, (v) the customer has the ability and intent to pay and collection of substantially all of the consideration is probable. We exercise reasonable judgment to determine the customer's ability and intent to pay, which is based upon various factors including the customer's historical payment experience or credit and financial information and credit risk management measures that we implement.
2. *Identify the performance obligations in the contract:* We assess whether each promised good or service is distinct for the purpose of identifying the various performance obligations in each contract. Promised goods and services are considered distinct provided that: (i) the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer; and, (ii) our promise to transfer the good or service to the customer is separately identifiable or distinct from other promises in the contract.
3. *Determine the transaction price:* Transaction price reflects the amount of consideration to which we expect to be entitled in exchange for transferring goods or services. Our contracts may include terms that could cause variability in the transaction price including rebates, rights of return, trade-in credits, and discounts. Variable consideration is generally accounted for at the portfolio level and estimated based on historical information.
4. *Allocate the transaction price to performance obligations in the contract:* If the contract contains a single performance obligation, the entire transaction price is allocated to that performance obligation. Many of our contracts include multiple performance obligations with a combination of distinct products and services, maintenance and support, professional services and/or training. For contracts with multiple performance

obligations, we allocate the total transaction value to each distinct performance obligation based on relative SSP. Judgment is required to determine the SSP for each distinct performance obligation. The best evidence of SSP is the observable price of a good or service when we sell that good or service separately under similar circumstances to similar customers. Since most contracts contain multiple performance obligations, we use information that may include market conditions and other observable inputs to estimate SSP when we don't have standalone transactions.

5. *Recognize revenue when (or as) performance obligations are satisfied:* Revenue is recognized at the point in time control is transferred to the customer. For hardware sales, transfer of control to the customer typically occurs at the point the product is shipped or delivered to the customer's designated location. For software license sales transfer of control to the customer typically occurs upon shipment, electronic delivery, or when the software is available for download by the customer. For sales of implementation service and custom solutions or in instances where products are sold along with essential installation services, transfer of control occurs and revenue is typically recognized upon customer acceptance. For fixed-price support and extended warranty contracts, or certain software arrangements which provide customers with a right to access over a discrete period, control is deemed to transfer over time and revenue is recognized on a straight-line basis over the contract term due to the stand-ready nature of the performance obligation. Revenue from hardware repairs and calibration services outside of an extended warranty or support contract is recognized at the time of completion of the related service. For other professional services or time-based labor contracts, revenue is recognized as we perform the services and the customers receive and/or consume the benefits.

Inventory valuation. We assess the valuation of our inventory on a periodic basis and make adjustments to the value for estimated excess and obsolete inventory based upon estimates about future demand and actual usage. Such estimates are difficult to make under most economic conditions. The excess balance determined by this analysis becomes the basis for our excess inventory charge. Our excess inventory review process includes analysis of sales forecasts, managing product rollovers and working with manufacturing to maximize recovery of excess inventory. If actual market conditions are less favorable than those projected by management, additional write-downs may be required. If actual market conditions are more favorable than anticipated, inventory previously written down may be sold to customers, resulting in lower cost of sales and higher income from operations than expected in that period.

Share-based compensation. We account for share-based awards in accordance with the provisions of the authoritative accounting guidance, which requires the measurement and recognition of compensation expense for all share-based payment awards made to our employees and directors. The fair value of share-based awards for employee stock option awards was estimated using the Black-Scholes option pricing model. Awards granted under the Keysight Technologies, Inc. Long-Term Performance ("LTP") Program are based on a variety of targets, such as total shareholder return ("TSR") or financial metrics such as operating margin, cost synergies and others. The awards based on TSR were valued using a Monte Carlo simulation model and those based on financial metrics were valued based on the market price of Keysight's common stock on the date of grant. Both the Black-Scholes and Monte Carlo simulation fair value models require the use of highly subjective and complex assumptions, including the option's expected life and the price volatility of the underlying stock. The estimated fair value of restricted stock awards is determined based on the market price of Keysight's common stock on the date of grant. We did not grant any option awards in 2019, 2018 and 2017.

Retirement and post-retirement benefit plan assumptions. Retirement and post-retirement benefit plan costs are a significant cost of doing business. They represent obligations that will ultimately be settled sometime in the future and therefore are subject to estimation. Pension accounting is intended to reflect the recognition of future benefit costs over the employees' average expected future service to Keysight based on the terms of the plans and investment and funding decisions. To estimate the impact of these future payments and our decisions concerning funding of these obligations, we are required to make assumptions using actuarial concepts within the framework of accounting principles generally accepted in the U.S. Two critical assumptions are the discount rate and the expected long-term return on plan assets. Other important assumptions include, expected future salary increases, expected future increases to benefit payments, expected retirement dates, employee turnover, retiree mortality rates, and investment portfolio composition. We evaluate these assumptions at least annually.

The discount rate is used to determine the present value of future benefit payments at the measurement date, which is October 31 for both U.S. and non-U.S. plans. The U.S. discount rates as of October 31, 2019 and 2018 were determined based on the results of matching expected plan benefit payments with cash flows from a hypothetically

constructed bond portfolio. The non-U.S. discount rates as of October 31, 2019 and 2018 were determined using spot rates along the yield curve to calculate disaggregated discount rates. In addition, we used this method to calculate two components of the periodic benefit cost: service cost and interest cost. If we changed our discount rate by 1 percent, the impact would be \$6 million on U.S. net periodic benefit cost and \$11 million on non-U.S. net periodic benefit cost. Lower discount rates increase the present value of the liability and subsequent year pension expense; higher discount rates decrease the present value of the liability and subsequent year pension expense.

The company uses alternate methods of amortization, as allowed by the authoritative guidance, that amortizes the actuarial gains and losses on a consistent basis for the years presented. For U.S. plans, gains and losses are amortized over the average future working lifetime. For most non-U.S. plans and U.S. post-retirement benefit plans, gains and losses are amortized using a separate layer for each year's gains and losses. The expected long-term return on plan assets is estimated using current and expected asset allocations as well as historical and expected returns. Plan assets are valued at fair value. If we changed our estimated return on assets by 1 percent, the impact would be \$7 million on U.S. net periodic benefit cost and \$14 million on non-U.S. net periodic benefit cost.

Goodwill and other intangible assets. We review goodwill for impairment annually during our fourth fiscal quarter and whenever events or changes in circumstances indicate the carrying value may not be recoverable. As defined in the authoritative guidance, a reporting unit is an operating segment, or one level below an operating segment. At the time of an acquisition, we assign goodwill to the reporting unit that is expected to benefit from the synergies of the combination.

Companies have the option to perform a qualitative assessment to determine whether performing a quantitative test is necessary. If an entity believes, as a result of its qualitative assessment, that it is more-likely-than-not that the fair value of a reporting unit is less than its carrying amount, the quantitative impairment test will be required. Otherwise, no further testing will be required.

The quantitative impairment test involves a comparison of the estimated fair value of a reporting unit to its carrying amount, including goodwill. We determine the fair value of a reporting unit using the results derived using the market approach, when available and appropriate, or the income approach, or a combination of both. If multiple valuation methodologies are used, the results are weighted accordingly. The income approach is estimated through the discounted cash flow ("DCF") analysis. Determining fair value requires the exercise of significant judgment, including judgments about appropriate discount rates, revenue growth rates, and the amount and timing of expected future cash flows. Discount rates are based on a weighted average cost of capital ("WACC"), which represents the average rate a business must pay its providers of debt and equity, plus a risk premium. The WACC used to test goodwill is derived from a group of comparable companies. The cash flows employed in the DCF analysis are derived from internal forecasts and external market forecasts. The market approach estimates the fair value of the reporting unit by utilizing the market comparable method which is based on revenue and earnings multiples from comparable companies. If the estimated fair value of a reporting unit exceeds its carrying amount, goodwill of the reporting unit is not impaired. If the carrying amount of a reporting unit exceeds its estimated fair value, then an impairment charge is recorded for the amount by which the carrying amount exceeds the reporting unit's fair value up to a maximum amount of the goodwill balance for the reporting unit.

In 2019 we performed our annual impairment test for all our reporting units. Based on the results of our testing, the fair value of each of our reporting units exceeded the carrying value. In 2018 we recorded impairment losses of \$709 million for our Ixia Solutions Group. See Note 11, "Goodwill and Other Intangible Assets," to the consolidated financial statements for additional information. There was no impairment of goodwill during the year ended October 31, 2017.

Other intangible assets consist primarily of developed technologies, proprietary know-how, trademarks, customer relationships, non-compete agreements, and backlog and are amortized using the straight-line method over estimated useful lives ranging from 6 months to 10 years. We review other intangible assets for impairment whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable or that the useful lives of these assets are no longer appropriate. No impairments of purchased intangible assets were recorded during the years ended October 31, 2019, 2018 and 2017.

We review indefinite-lived intangible assets for impairment whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable or that the useful lives of these assets are no longer appropriate. The authoritative accounting guidance allows a qualitative approach for testing indefinite-lived intangible assets for impairment, similar to the impairment testing guidance for goodwill. It allows

the option to first assess qualitative factors (events and circumstances) that could have affected the significant inputs used in determining the fair value of the indefinite-lived intangible asset. The qualitative factors assist in determining whether it is more-likely-than-not that the indefinite-lived intangible asset is impaired. An organization may choose to bypass the qualitative assessment for any indefinite-lived intangible asset in any period and proceed directly to calculating its fair value. Our indefinite-lived intangible assets are in-process research and development (“IPR&D”) intangible assets. In 2019, 2018 and 2017, we assessed impairment by performing a qualitative test. No impairment of indefinite-lived intangible assets was recorded in 2019. In 2018 and 2017, we recorded impairment charges of \$5 million and \$7 million, respectively, related to cancellations of IPR&D projects.

Warranty. Keysight warranties on products sold through direct sales channels are primarily for one year. Warranties for products sold through distribution channels are primarily for three years. We accrue for standard warranty costs based on historical trends in warranty charges. The accrual is reviewed regularly and periodically adjusted to reflect changes in warranty cost estimates. Estimated warranty charges are recorded within cost of products at the time related product revenue is recognized.

We also sell extended warranties that provide warranty coverage beyond the standard warranty term. Revenue associated with extended warranties is deferred and recognized over the extended coverage period.

Loss Contingencies. As discussed in Note 16 and 17 to the consolidated financial statements, we are, from time to time, subject to a variety of litigation and similar contingent liabilities incidental to our business (or the business operations of previously owned entities). We recognize a liability for any contingency that is known or probable of occurrence and reasonably estimable. These assessments require judgments concerning matters such as litigation developments and outcomes, the anticipated outcome of negotiations, the number of future claims and the cost of both pending and future claims. In addition, because most contingencies are resolved over long periods of time, liabilities may change in the future due to various factors. Changes in these factors could materially impact our financial position or our results of operation.

Restructuring. The main component of our restructuring plan is related to workforce reductions and site restructuring. Workforce reduction charges are accrued when payment of benefits becomes probable and the amounts can be estimated. If the amounts and timing of cash flows from restructuring activities are significantly different from what we have estimated, the actual amount of restructuring and other related charges could be materially different, either higher or lower, than those we have recorded.

Accounting for income taxes. We must make certain estimates and judgments in determining income tax expense for financial statement purposes. These estimates and judgments occur in the calculation of tax credits, benefits and deductions, and in the calculation of certain tax assets and liabilities which arise from differences in the timing of recognition of revenue and expense for tax and financial statement purposes, as well as interest and penalties related to uncertain tax positions. Significant changes to these estimates may result in an increase or decrease to our tax provision in a subsequent period.

Significant management judgment is also required in determining whether deferred tax assets will be realized in full or in part. When it is more-likely-than-not that all or some portion of specific deferred tax assets such as net operating losses or foreign tax credit carryforwards will not be realized, a valuation allowance must be established for the amount of the deferred tax assets that cannot be realized. We consider all available positive and negative evidence on a jurisdiction-by-jurisdiction basis when assessing whether it is more likely than not that deferred tax assets are recoverable. We consider evidence such as our past operating results, the existence of losses in recent years and our forecast of future taxable income. At October 31, 2019, the company maintains a valuation allowance mainly related to capital losses in the U.K., net operating losses in the Netherlands and U.K., and California research credits. We intend to maintain a valuation allowance in these jurisdictions until sufficient positive evidence exists to support their reversal.

The calculation of our tax liabilities involves dealing with uncertainties in the application of complex tax law and regulations in a multitude of jurisdictions. Although the guidance on the accounting for uncertainty in income taxes prescribes the use of a recognition and measurement model, the determination of whether an uncertain tax position has met those thresholds will continue to require significant judgment by management. In accordance with the guidance on the accounting for uncertainty in income taxes, for all U.S. and other tax jurisdictions, we recognize potential liabilities for anticipated tax audit issues based on our estimate of whether, and the extent to which, additional taxes and interest will be due. The ultimate resolution of tax uncertainties may differ from what is currently estimated, which could result in a material impact on income tax expense. If our estimate of income tax liabilities

proves to be less than the ultimate assessment, a further charge to expense would be required. If events occur and the payment of these amounts ultimately proves to be unnecessary, the reversal of the liabilities would result in tax benefits being recognized in the period when we determine the liabilities are no longer necessary. We include interest and penalties related to unrecognized tax benefits within the provision for income taxes in the consolidated statements of operations.

New Accounting Standards

See Note 2, “New Accounting Pronouncements,” to the consolidated financial statements for a description of new accounting pronouncements.

QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

At various times, we use derivative financial instruments to limit exposure to changes in foreign currency exchange rates and interest rates. Because derivative instruments are used solely as hedges and not for speculative trading purposes, fluctuations in the market values of such derivative instruments are generally offset by reciprocal changes in the underlying economic exposures that the instruments are intended to hedge. For further discussion of derivative financial instruments, refer to Note 14, "Derivatives."

Currency exchange rate risk

We are exposed to foreign currency exchange rate risks inherent in our sales commitments, anticipated sales, and assets and liabilities denominated in currencies other than the functional currency of our subsidiaries. We hedge future cash flows denominated in currencies other than the functional currency using sales and expense forecasts up to twelve months in advance. Our exposure to exchange rate risks is managed on an enterprise-wide basis. This strategy utilizes derivative financial instruments, including option and forward contracts, to hedge certain foreign currency exposures with the intent of offsetting gains and losses that occur on the underlying exposures with gains and losses on the derivative contracts hedging them. We do not currently and do not intend to utilize derivative financial instruments for speculative trading purposes.

Our operations generate non-functional currency cash flows such as revenue, third-party vendor payments and inter-company payments. In anticipation of these foreign currency cash flows and in view of the volatility of the currency market, we enter into such foreign exchange contracts as described above to substantially mitigate our currency risk. In 2019, 2018 and 2017, approximately 74 percent, 76 percent and 71 percent of our revenues were generated in U.S. dollars.

We performed a sensitivity analysis assuming a hypothetical 10 percent adverse movement in foreign exchange rates to the hedging contracts and the underlying exposures described above. As of October 31, 2019 and 2018, the analysis indicated that these hypothetical market movements would not have a material effect on our consolidated financial position, results of operations or cash flows.

Interest rate risk

As of October 31, 2019, we had \$1.8 billion in principal amount of senior debt outstanding. The carrying amount of the fixed-rate senior notes was \$1.8 billion, and the related fair value based on quoted prices was \$1.9 billion. A change in interest rates on long-term debt impacts the fair value of the company's fixed-rate long-term debt but not the company's earnings or cash flow because the interest on such debt is fixed. Generally, the fair market value of fixed-rate debt will increase as interest rates fall and decrease as interest rates rise.

As of October 31, 2019, a hypothetical 10 percent increase in interest rates would have decreased the fair value of the company's fixed-rate long-term debt by approximately \$33 million. However, since the company currently has no plans to repurchase its outstanding fixed-rate instruments before their maturity nor do the investors in our fixed-rate debt obligations have the right to demand we pay off these obligations prior to maturity, the impact of market interest rate fluctuations on the company's fixed-rate long-term debt does not affect the company's results of operations or stockholders' equity.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and Board of Directors of Keysight Technologies, Inc.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Keysight Technologies, Inc. and its subsidiaries (the “Company”) as of October 31, 2019 and 2018, and the related consolidated statements of operations, of comprehensive income, of equity and of cash flows for each of the three years in the period ended October 31, 2019, including the related notes and financial statement schedule of valuation and qualifying accounts for each of the three years in the period ended October 31, 2019 appearing under Item 15(a)(2) (collectively referred to as the “consolidated financial statements”). We also have audited the Company’s internal control over financial reporting as of October 31, 2019 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 October 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended October 31, 2019 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 October 31, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Changes in Accounting Principles

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for pension costs and the manner in which it accounts for revenues from contracts with customers in 2019.

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 appearing 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 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.

Critical Audit Matters

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

Goodwill Impairment Assessment - Ixia Solutions Group ("ISG") Reporting Unit

As described in Notes 1 and 11 to the consolidated financial statements, the Company's consolidated goodwill balance was \$1,209 million as of October 31, 2019, and the goodwill associated with the ISG reportable segment, which only includes the ISG reporting unit, was \$407 million. Goodwill is assessed for impairment on a reporting unit basis at least annually in the fourth quarter, as of September 30, or more frequently when events or circumstances occur indicating that the recorded goodwill may be impaired. The impairment test compares the fair value of a reporting unit with its carrying value, with an impairment charge recorded for the amount by which the carrying amount exceeds the reporting unit's fair value up to a maximum amount of the goodwill balance for the reporting unit. Management determined the fair value of the ISG reporting unit based on the income and market approaches, weighted at 60 and 40 percent, respectively. With respect to the income approach, the discounted cash flow method was used, which included an eight year future cash flow projection and an estimated terminal value. As disclosed by management, determining fair value requires the exercise of significant judgment, including judgments about appropriate discount rates, revenue growth rates, and the amount and timing of expected future cash flows.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessment of the ISG reporting unit is a critical audit matter are there was significant judgment by management when determining the fair value measurement of the ISG reporting unit. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating evidence related to management's cash flow projections and significant assumptions related to the revenue growth rates and the discount rate. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained from these procedures.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the financial statements. These procedures included testing the effectiveness of controls relating to management's goodwill impairment assessment, including controls over the valuation of the Company's reporting units. These procedures also included, among others, (i) testing management's process for developing the fair value estimate, (ii) evaluating the appropriateness of the income approach, (iii) testing the completeness, accuracy, and relevance of underlying data used in the income approach, and (iv) evaluating the significant assumptions used by management, including the revenue growth rates and the discount rate. Evaluating management's assumptions related to the revenue growth rates involved evaluating whether the assumptions used by management were reasonable considering (i) the current and past performance of the reporting unit, (ii) the consistency with external market and industry data, and (iii) whether these assumptions were consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in the evaluation of the Company's income approach and certain significant assumptions, including the discount rate.

Income Tax Reserves - Unrecognized Tax Benefits

As described in Note 6 to the consolidated financial statements, as of October 31, 2019, the total amount of gross unrecognized tax benefits was \$226 million. The calculation of the tax liabilities involves dealing with uncertainties in the application of complex tax law and regulations in a multitude of jurisdictions. Potential liabilities for anticipated tax audit issues are recognized based on management's estimate of whether, and the extent to which, additional taxes and interest will be due, and management applies significant judgment in determining whether an uncertain tax position has met the recognition and measurement thresholds.

The principal considerations for our determination that performing procedures relating to unrecognized tax benefits is a critical audit matter are there was significant judgment by management when determining the uncertain tax positions that met the recognition and measurement thresholds, including a high degree of estimation uncertainty relative to the complex tax law and regulations in a multitude of jurisdictions, and the potential for significant adjustments as a result of tax audits. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures to evaluate management's assessment of the identified uncertain tax positions that met the recognition and measurement thresholds.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to recognition of unrecognized tax benefits. These procedures also included, among others, (i) testing the information used in the calculation of the liability for unrecognized tax benefits, (ii) testing the calculation of the liability for unrecognized tax benefits by jurisdiction, including management's assessment of the technical merits of uncertain tax positions, (iii) testing the completeness of management's assessment of both the identification of uncertain tax positions and possible outcomes of each uncertain tax position, and (iv) evaluating the status and results of tax audits with the relevant tax authorities. Procedures were also performed to evaluate the reasonableness of management's assessment of whether tax positions are more-likely-than-not of being sustained and the amount of potential benefit to be realized, and the application of relevant tax laws.

/s/ PricewaterhouseCoopers LLP

San Francisco, California
December 18, 2019

We have served as the Company's auditor since 2013.

KEYSIGHT TECHNOLOGIES, INC.
CONSOLIDATED STATEMENT OF OPERATIONS
(in millions, except per share data)

	Year Ended October 31,		
	2019	2018	2017
Net revenue:			
Products	\$3,554	\$3,229	\$2,664
Services and other	749	649	525
Total net revenue	4,303	3,878	3,189
Costs and expenses:			
Cost of products	1,439	1,449	1,210
Cost of services and other	330	318	282
Total costs	1,769	1,767	1,492
Research and development	688	624	507
Selling, general and administrative	1,155	1,205	1,058
Goodwill impairment	—	709	—
Other operating expense (income), net	(20)	(33)	(16)
Total costs and expenses	3,592	4,272	3,041
Income (loss) from operations	711	(394)	148
Interest income	23	12	7
Interest expense	(80)	(83)	(80)
Other income (expense), net	61	54	104
Income (loss) before taxes	715	(411)	179
Provision (benefit) for income taxes	94	(576)	77
Net income	<u>\$ 621</u>	<u>\$ 165</u>	<u>\$ 102</u>
Net income per share:			
Basic	\$ 3.31	\$ 0.88	\$ 0.57
Diluted	\$ 3.25	\$ 0.86	\$ 0.56
Weighted average shares used in computing net income per share:			
Basic	188	187	180
Diluted	191	191	182

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

KEYSIGHT TECHNOLOGIES, INC.
CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME
(in millions)

	Year Ended October 31,		
	2019	2018	2017
Net income.....	\$621	\$165	\$102
Other comprehensive income (loss):			
Unrealized gain (loss) on investments, net of tax benefit (expense) of zero, \$3 and \$(1).....	—	(14)	4
Unrealized gain (loss) on derivative instruments, net of tax benefit (expense) of \$1, zero and \$(2).....	(4)	—	4
Amounts reclassified into earnings related to derivative instruments, net of tax benefit (expense) of zero, \$1 and \$(1)	3	(3)	—
Foreign currency translation, net of tax benefit (expense) of zero	17	(21)	(10)
Net defined benefit pension cost and post retirement plan costs:			
Change in actuarial net gain (loss), net of tax benefit (expense) of \$28, \$(7) and \$(68)	(91)	23	178
Change in net prior service credit, net of tax benefit of \$4, \$6 and \$9	(15)	(16)	(15)
Other comprehensive income (loss)	(90)	(31)	161
Total comprehensive income.....	<u>\$531</u>	<u>\$134</u>	<u>\$263</u>

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

KEYSIGHT TECHNOLOGIES, INC.
CONSOLIDATED BALANCE SHEET
(in millions, except par value and share data)

	October 31,	
	<u>2019</u>	<u>2018</u>
ASSETS		
Current assets:		
Cash and cash equivalents	\$1,598	\$ 913
Accounts receivable, net	668	624
Inventory	705	619
Other current assets	<u>244</u>	<u>222</u>
Total current assets	3,215	2,378
Property, plant and equipment, net	576	555
Goodwill	1,209	1,171
Other intangible assets, net	490	645
Long-term investments	46	46
Long-term deferred tax assets	755	750
Other assets	<u>332</u>	<u>279</u>
Total assets	<u>\$6,623</u>	<u>\$5,824</u>
LIABILITIES AND EQUITY		
Current liabilities:		
Short-term debt	\$ —	\$ 499
Accounts payable	253	242
Employee compensation and benefits	278	276
Deferred revenue	334	334
Income and other taxes payable	55	42
Other accrued liabilities	<u>83</u>	<u>69</u>
Total current liabilities	1,003	1,462
Long-term debt	1,788	1,291
Retirement and post-retirement benefits	357	224
Long-term deferred revenue	176	127
Other long-term liabilities	<u>295</u>	<u>287</u>
Total liabilities	<u>3,619</u>	<u>3,391</u>
Commitments and contingencies (Note 17)		
Stockholders' equity:		
Preferred stock; \$0.01 par value; 100 million shares authorized; none issued and outstanding	—	—
Common stock; \$0.01 par value; 1 billion shares authorized; 194 million shares at October 31, 2019, and 191 million shares at October 31, 2018 issued	2	2
Treasury stock at cost; 6.5 million shares at October 31, 2019 and 4.4 million shares at October 31, 2018	(342)	(182)
Additional paid-in-capital	2,013	1,889
Retained earnings	1,909	1,212
Accumulated other comprehensive loss	<u>(578)</u>	<u>(488)</u>
Total stockholders' equity	<u>3,004</u>	<u>2,433</u>
Total liabilities and equity	<u>\$6,623</u>	<u>\$5,824</u>

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

KEYSIGHT TECHNOLOGIES, INC.
CONSOLIDATED STATEMENT OF CASH FLOWS
(in millions)

	Year Ended October 31,		
	2019	2018	2017
Cash flows from operating activities:			
Net income.....	\$ 621	\$ 165	\$ 102
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation.....	96	103	92
Amortization.....	212	207	133
Share-based compensation.....	82	59	56
Debt issuance expense.....	—	—	9
Deferred tax benefit.....	(2)	(789)	(47)
Excess and obsolete inventory related charges.....	27	25	16
Gain on sale of assets and divestitures.....	(1)	(20)	(8)
Goodwill impairment.....	—	709	—
Pension curtailment and settlement loss (gain).....	2	1	(69)
Other non-cash expenses, net.....	(4)	15	17
Changes in assets and liabilities:			
Accounts receivable.....	(26)	(89)	(11)
Inventory.....	(92)	(61)	(4)
Accounts payable.....	13	22	15
Employee compensation and benefits.....	—	63	(1)
Deferred revenue.....	112	75	90
Income taxes payable.....	(16)	181	3
Retirement and post-retirement benefits.....	(37)	(127)	(15)
Other assets and liabilities.....	11	16	(50)
Net cash provided by operating activities.....	998	555	328
Cash flows from investing activities:			
Purchases of property, plant and equipment.....	(120)	(132)	(72)
Proceeds from the sale of assets and divestitures.....	2	29	8
Acquisitions of businesses and intangible assets, net of cash acquired.....	(88)	(5)	(1,702)
Proceeds from the sale of investments.....	7	—	45
Other investing activities.....	3	—	(1)
Net cash used in investing activities.....	(196)	(108)	(1,722)
Cash flows from financing activities:			
Issuance of common stock under employee stock plans.....	67	64	51
Issuance of common stock under public offering.....	—	—	444
Payment of taxes related to net share settlement of equity awards.....	(26)	(18)	(12)
Treasury stock repurchases.....	(159)	(120)	—
Proceeds from issuance of long-term debt.....	500	—	1,069
Debt issuance costs.....	(4)	—	(16)
Proceeds from short-term borrowings.....	—	40	212
Repayment of debt and credit facility.....	(500)	(300)	(323)
Payment of acquisition-related contingent consideration.....	—	(6)	—
Other financing activities.....	—	(1)	—
Net cash provided by/(used in) financing activities.....	(122)	(341)	1,425
Effect of exchange rate movements.....	3	(9)	4
Net increase in cash, cash equivalents, and restricted cash.....	683	97	35
Cash, cash equivalents, and restricted cash at beginning of year.....	917	820	785
Cash, cash equivalents, and restricted cash at end of year.....	\$1,600	\$ 917	\$ 820

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

KEYSIGHT TECHNOLOGIES, INC.
CONSOLIDATED STATEMENT OF EQUITY
(in millions, except number of shares in thousands)

	Common Stock			Treasury Stock			Accumulated	
	Number of Shares	Par Value	Additional Paid-in Capital	Number of Shares	Treasury Stock at Cost	Retained Earnings	Other Comprehensive Income/(Loss)	Total Stockholders' Equity
Balance as of October 31, 2016.	172,287	\$ 2	\$1,242	(2,289)	\$ (62)	\$ 949	\$(618)	\$1,513
Adjustment due to adoption of new accounting standards.	—	—	—	—	—	(10)	—	(10)
Net income	—	—	—	—	—	102	—	102
Other comprehensive income, net of tax.	—	—	—	—	—	—	161	161
Issuance of common stock	2,880	—	41	—	—	—	—	41
Public offering of common stock	13,143	—	444	—	—	—	—	444
Share-based compensation	—	—	56	—	—	—	—	56
Tax benefits from share-based awards issued.	—	—	3	—	—	—	—	3
Balance as of October 31, 2017.	188,310	2	1,786	(2,289)	(62)	1,041	(457)	2,310
Adjustment due to adoption of new accounting standards.	—	—	—	—	—	6	—	6
Net income	—	—	—	—	—	165	—	165
Other comprehensive loss, net of tax.	—	—	—	—	—	—	(31)	(31)
Issuance of common stock	2,894	—	44	—	—	—	—	44
Share-based compensation	—	—	59	—	—	—	—	59
Repurchase of common stock	—	—	—	(2,075)	(120)	—	—	(120)
Balance as of October 31, 2018.	191,204	2	1,889	(4,364)	(182)	1,212	(488)	2,433
Adjustment due to adoption of new accounting standards.	—	—	—	—	—	76	—	76
Net income	—	—	—	—	—	621	—	621
Other comprehensive loss, net of tax.	—	—	—	—	—	—	(90)	(90)
Issuance of common stock	2,565	—	42	—	—	—	—	42
Share-based compensation	—	—	82	—	—	—	—	82
Repurchase of common stock	—	—	—	(2,094)	(160)	—	—	(160)
Balance as of October 31, 2019.	<u>193,769</u>	<u>\$ 2</u>	<u>\$2,013</u>	<u>(6,458)</u>	<u>\$(342)</u>	<u>\$1,909</u>	<u>\$(578)</u>	<u>\$3,004</u>

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

KEYSIGHT TECHNOLOGIES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. OVERVIEW, BASIS OF PRESENTATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Overview. Keysight Technologies, Inc. (“we,” “us,” “Keysight” or the “company”), incorporated in Delaware on December 6, 2013, is a technology company that helps enterprises, service providers and governments accelerate innovation to connect and secure the world by providing electronic design and test solutions that are used in the simulation, design, validation, manufacture, installation, optimization and secure operation of electronics systems in the communications, networking and electronics industries. We also offer customization, consulting and optimization services throughout the customer’s product lifecycle, including start-up assistance, asset management, up-time services, application services and instrument calibration and repair.

Basis of Presentation. We have prepared the accompanying financial statements pursuant to the rules and regulations of the SEC and in conformity with generally accepted accounting principles in the U.S. (“GAAP”). Our fiscal year end is October 31. Unless otherwise stated, all years and dates refer to our fiscal year.

Management is responsible for the fair presentation of the accompanying consolidated financial statements, prepared in accordance with GAAP, and has full responsibility for their integrity and accuracy. In the opinion of management, the accompanying consolidated financial statements contain all normal and recurring adjustments necessary to present fairly our consolidated balance sheet and our consolidated statement of operations, statement of comprehensive income, statement of cash flows and statement of equity.

Principles of consolidation. The consolidated financial statements include the accounts of the company and our wholly- and majority-owned subsidiaries. All significant inter-company transactions have been eliminated.

Use of Estimates. The preparation of financial statements in accordance with GAAP requires management to make estimates and assumptions that affect the amounts reported in our consolidated financial statements and accompanying notes. Management bases its estimates on historical experience and various other assumptions believed to be reasonable. Although these estimates are based on management’s knowledge of current events and actions that may impact the company in the future, actual results may be different from the estimates. Our critical accounting policies are those that affect our financial statements materially and involve difficult, subjective or complex judgments by management. Those policies are revenue recognition, inventory valuation, share-based compensation, retirement and post-retirement plan assumptions, valuation of goodwill and other intangible assets, warranty, loss contingencies, restructuring and accounting for income taxes.

Revenue recognition. We adopted Accounting Standards Codification (“ASC”) 606, *Revenue from Contracts with Customers* on November 1, 2018 using the modified retrospective method for all contracts not completed as of the date of adoption. The reported results for 2019 reflect the application of ASC 606 while the reported results for 2018 and 2017 were prepared under the guidance of ASC 605, *Revenue Recognition*. For additional information on the new revenue recognition guidance and the impact of adoption, see Note 2, “New Accounting Pronouncements.”

Revenue is recognized upon transfer of control of the promised products or services to customers in an amount that reflects the consideration we expect to receive in exchange for those products or services. We primarily generate revenue from the sale of products (hardware and/or software), services, or a combination thereof. We enter into contracts that may involve multiple performance obligations, and we allocate the transaction price between each performance obligation on the basis of relative standalone selling price. Revenue is recognized net of allowances for returns and any taxes collected from customers, which are subsequently remitted to governmental authorities.

Nature of Goods and Services

Product revenues are generated predominantly from the sale of various types of design and test software and hardware. Products consist of standalone software and hardware, generally with installed software applications that are licensed on a perpetual and term basis. Our hardware products generally do not have any substantive acceptance terms that would otherwise preclude the transfer of control. Performance obligations related to our software licenses, including the license portion of our software subscriptions, grant the customer the right to use our software via electronic delivery.

Service revenues consist of repair and calibration services, extended warranties, technical support for hardware and software, when-and-if available software updates and upgrades, and professional services, including installation

and implementation, consulting, and training. Services include both hardware and software services. Repair and calibration services for hardware products are sold both as per-incident customer services and as customer agreements to provide such services over the contractual period. Extended warranties are optional to the customer and provide warranty on hardware products for additional years beyond the standard one-year warranty. Technical support for software and when-and-if available software updates and upgrades are sold either together with our software licenses and software subscriptions, or separately as part of our customer support programs. These are considered stand-ready performance obligations where customers benefit from the services evenly throughout the license or service period. These performance obligations provide the customer access evenly over the contract period. Our professional services may be sold on a time and material basis (e.g., consulting) or on a fixed-fee basis (e.g., non-recurring engineering).

We also generate revenues from a combination of products and services (“custom solutions”), including combinations of hardware, software, installation or other start-up services, software subscriptions, and/or software support services. Custom solutions provide the customer with a combination of hardware, software and professional services to meet customers’ unique specifications.

For our contracts with customers, we account for individual performance obligations separately if they are distinct. Our standard payment terms are net 30 to 90 days, and we generally do not offer extended payment terms beyond one year. Our contracts typically contain various forms of variable consideration, including trade discounts, trade-in credits, rebates, and rights of return. The transaction price is allocated to the separate performance obligations on a relative standalone selling price basis. Standalone selling prices for a majority of our products and services are estimated based on our established pricing practices and maximize the use of observable inputs. We have elected to exclude from the measurement of the transaction price all taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction and collected by Keysight from a customer (e.g., sales, use, value added, and some excise taxes). We have also elected to account for shipping and handling activities that occur after control of the related good transfers as fulfillment activities instead of assessing such activities as performance obligations.

Our typical performance obligations include the following:

Performance obligation	When performance obligation is typically satisfied	When payment is typically due	How standalone selling price is typically determined
<u><i>Product Revenues</i></u>			
Hardware	When customer obtains control of the product, typically at delivery (point in time)	Within 30-90 days of shipment	Estimated based on established pricing practices or observable based on standalone sales for certain hardware products
Software licenses	Upon electronic delivery of the software, and the applicable license period has begun (point in time)	Within 30-90 days of the beginning of license period	Estimated based on established pricing practices or observable based on standalone sales for certain software products
Threat intelligence solutions	Ratably over the subscription period (over time)	Within 30-90 days of the beginning of subscription period	Estimated based on established pricing practices
<u><i>Service Revenues</i></u>			
Calibration contracts	Ratably over the service contract period (over time)	Within 30-90 days of the beginning of service contract period	Estimated based on established pricing practices
Repair and calibration (per- incident)	As services are performed (point in time)	Within 30-90 days of invoicing for services rendered	Estimated based on established pricing practices

<u>Performance obligation</u>	<u>When performance obligation is typically satisfied</u>	<u>When payment is typically due</u>	<u>How standalone selling price is typically determined</u>
Extended hardware warranty	Ratably over the warranty period (over time)	Within 30-90 days of invoicing	Estimated based on established pricing practices or observable based on standalone sales of certain hardware warranty contracts
Technical support and when-and-if-available software updates	Ratably over the license service contract period (over time)	Within 30-90 days of the beginning of license or service contract period	Estimated based on established pricing practices or observable based on standalone sales for certain support contracts
Professional services	As services are performed based on measures of progress (over time) or at a point in time	Within 30-90 days of invoicing for services rendered	Estimated based on established pricing practices
<i>Custom Solutions</i>			
Custom solutions (milestone-based)	As milestones are achieved based on transfer of control to customer (over time)	Within 30-90 days of milestone achievement	Transaction price, as pricing is custom and can vary significantly from contract to contract
Custom solutions (point in time)	When customer obtains control of the solution, typically at delivery (point in time)	Within 30-90 days of delivery of solution	Transaction price, as pricing is custom and can vary significantly from contract to contract

Significant Judgments

Judgment is required to determine the standalone selling price for each distinct performance obligation. As most of our products and services are not sold on a standalone basis, we typically estimate the standalone selling price. In doing so, we consider our internal price list for each product and service, which reflects our desired profitability, based on an expected level of sales, and adjust for factors such as competition, customer relationship, discount provided in the contract, geographic location, and the products and services purchased in the arrangement. We use a range based on actual historical sales to determine whether the calculated standalone selling price for a product or service is a fair representation of the standalone selling price.

For capitalized contract costs, we use judgment in determining the capitalized amount.

Our products are generally sold with a right of return and we may provide other credits, discounts, or incentives, which are accounted for as variable consideration when estimating the amount of revenue to recognize. Returns, credits, and discounts are estimated at contract inception and updated at the end of each reporting period as additional information becomes available to the extent that it is probable a significant reversal of the cumulative amount of revenue recognized will not occur once the variability is subsequently resolved.

Shipping and handling costs. Our shipping and handling costs charged to customers are included in net revenue, and the associated expense is recorded in cost of products for all periods presented.

Deferred revenue. We recognize contract liabilities in our consolidated balance sheet as deferred revenue which represents the amount of service and software revenue deferred and recognized over the contractual period or as services are rendered and accepted by the customer. In addition, it includes the amount allocated to undelivered performance obligations.

Accounts receivable, net. Trade accounts receivable are recorded at the invoiced amount and do not bear interest. Such accounts receivable have been reduced by an allowance for doubtful accounts, which is our best estimate of the

amount of probable credit losses in our existing accounts receivable. We determine the allowance based on customer specific experience and the aging of such receivables, among other factors. The allowance for doubtful accounts was approximately \$3 million and \$2 million as of October 31, 2019 and 2018, respectively. We do not have any off-balance-sheet credit exposure related to our customers. Prior to November 1, 2018, accounts receivable were also recorded net of estimated product returns. Effective November 1, 2018, we reclassified our allowance for sales returns from accounts receivable, net to other accrued liabilities due to the adoption of ASC 606.

Share-based compensation. We account for share-based awards made to our employees and directors, including restricted stock units, employee stock purchases made under Keysight's Employee Stock Purchase Plan ("Keysight's ESPP"), employee stock option awards, and performance share awards under Keysight Technologies, Inc. Long-Term Performance ("Keysight's LTP") Program, using the estimated grant date fair value method of accounting. We recorded compensation expense for all share-based awards of \$82 million in 2019, \$59 million in 2018 and \$56 million in 2017.

Inventory. Inventory is valued at standard cost, which approximates actual cost computed on a first-in, first-out basis, not in excess of market value. We assess the valuation of our inventory on a periodic basis and make adjustments to the value for estimated excess and obsolete inventory based on estimates about future demand and actual usage. The excess balance determined by this analysis becomes the basis for our excess inventory charge. Our excess inventory review process includes analysis of sales unit forecasts, managing product rollovers and working with manufacturing to maximize recovery of excess inventory.

Warranty. Keysight warranties on products sold through direct sales channels are primarily for one year. Warranties for products sold through distribution channels are primarily for three years. We accrue for standard warranty costs based on historical trends in warranty charges. The accrual is reviewed regularly and periodically adjusted to reflect changes in warranty cost estimates. Estimated warranty charges are recorded within cost of products at the time related product revenue is recognized. See Note 16, "Guarantees."

We also sell extended warranties that provide warranty coverage beyond the standard warranty term. Revenue associated with extended warranties is deferred and recognized over the extended coverage period.

Loss contingencies. We accrue for probable losses from contingencies, including legal settlement costs, on an undiscounted basis when such costs are considered probable of being incurred and are reasonably estimable. We periodically evaluate available information, both internal and external, relative to such contingencies and adjust this accrual as necessary.

Taxes on income. Income tax expense is based on income or loss before taxes. Deferred income taxes reflect the effect of temporary differences between asset and liability amounts that are recognized for financial reporting purposes and the amounts that are recognized for income tax purposes. These deferred taxes are measured by applying currently enacted tax laws. Valuation allowances are recognized to reduce deferred tax assets to the amount that is more likely than not to be realized.

We account for uncertainty in income taxes using a two-step approach to recognize and measure uncertain tax positions. The first step is to evaluate the tax position for recognition by determining if the weight of available evidence indicates that it is more likely than not that the position will be sustained on audit, including resolution of related appeals or litigation processes, if any. The second step is to measure the tax benefit as the largest amount that is more than 50 percent likely of being realized upon settlement. We make adjustments to these reserves when facts and circumstances change, such as the closing of a tax audit or the refinement of an estimate due to new information. We classify the liability for unrecognized tax benefits as current to the extent that the company anticipates payment (or receipt) of cash within one year. Interest and penalties related to uncertain tax positions are recognized in the provision for income taxes. Given the number of years and numerous matters that remain subject to examination in various tax jurisdictions, we are unable to estimate the range of possible changes to the balance of our unrecognized tax benefits.

Goodwill and other intangible assets. Goodwill is assessed for impairment on a reporting unit basis at least annually in the fourth quarter, as of September 30, or more frequently when events and circumstances occur indicating that the recorded goodwill may be impaired. The impairment test compares the fair value of a reporting unit with its carrying amount, with an impairment charge recorded for the amount by which the carrying amount exceeds the reporting unit's fair value up to a maximum amount of the goodwill balance for the reporting unit. We determine fair values for each of the reporting units using the market approach, when available and appropriate, or

the income approach, or a combination of both. If multiple valuation methodologies are used, the results are weighted appropriately. Valuations using the market approach are derived from metrics of publicly traded comparable companies. The selections of comparable businesses are based on the markets in which our reporting units operate, giving consideration to risk profiles, size, geography and diversity of products and services. Under the income approach, fair value is determined based on the present value of estimated future cash flows, discounted at an appropriate risk-adjusted rate. We use our internal forecasts to estimate future cash flows and include an estimate of long-term future growth rates based on our most recent views of the long-term outlook for each business.

As defined in the authoritative guidance, a reporting unit is an operating segment or one level below an operating segment. During the fourth quarter of 2019, we performed our annual impairment test for all our reporting units. Based on the results of our testing, the fair value of each of our reporting units exceeded the carrying value. We recorded an impairment loss of \$709 million for the ISG reporting unit for the year ended October 31, 2018. There were no impairments of goodwill during the years ended October 31, 2019 and 2017. Refer to Note 3, "Acquisitions," and Note 11, "Goodwill and Other Intangible Assets," for additional information about our goodwill and other intangible assets.

Other intangible assets consist primarily of developed technologies, proprietary know-how, trademarks, customer relationships, non-compete agreements, and acquired backlog and are amortized using the straight-line method over estimated useful lives ranging from 6 months to 10 years. We review other intangible assets for impairment whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable or that the useful lives of these assets are no longer appropriate. No impairments of purchased intangible assets were recorded during the years ended October 31, 2019, 2018 and 2017.

The authoritative accounting guidance allows a qualitative approach for testing indefinite-lived intangible assets for impairment, similar to the impairment testing guidance for goodwill. It allows the option to first assess qualitative factors (events and circumstances) that could have affected the significant inputs used in determining the fair value of the indefinite-lived intangible asset. The qualitative factors assist in determining whether it is more-likely-than-not that the indefinite-lived intangible asset is impaired. An organization may choose to bypass the qualitative assessment for any indefinite-lived intangible asset in any period and proceed directly to calculating its fair value. Our indefinite-lived intangible assets are in-process research and development ("IPR&D") intangible assets. In 2019 we assessed impairment by performing a qualitative test and concluded that no impairment of indefinite-lived intangible assets was required. As a result of the cancellations of IPR&D projects in 2018 and 2017, we recorded impairment charges of \$5 million and \$7 million, respectively.

Advertising. Advertising costs are expensed as incurred and were \$22 million in 2019, \$21 million in 2018 and \$22 million in 2017.

Research and development. Costs related to the research, design and development of our products are charged to research and development expense as they are incurred.

Sales taxes. Sales taxes collected from customers and remitted to governmental authorities are not included in our revenue.

Investments. Investments with readily determinable fair values and trading securities are reported at fair value. Equity investments without readily determinable fair values are measured at cost with adjustments for observable changes in price or impairments. Gains or losses resulting from changes in fair value are recognized currently in earnings. The company assesses investments for impairment whenever events or changes in circumstances indicate that the carrying value of an investment may not be recoverable. There was no impairment recognized in 2019, 2018 and 2017.

Net income per share. Basic net income per share is computed by dividing net income by the weighted average number of common shares outstanding during the period excluding the dilutive effect of stock options and other employee stock plans. Diluted net income per share gives effect to all potentially dilutive common stock equivalents outstanding during the period. The dilutive effect of share-based awards is reflected in diluted net income per share by application of the treasury stock method, which includes consideration of unamortized share-based compensation expense, and the dilutive effect of in-the-money options and non-vested restricted stock units. Under the treasury stock method, the amount the employee must pay for exercising stock options and unamortized share-based compensation expense are assumed proceeds to be used to repurchase hypothetical shares.

Cash, cash equivalents and short-term investments. We classify investments as cash equivalents if their original maturity or remaining maturity at the time of purchase is three months or less at the date of purchase. Cash equivalents are stated at cost, which approximates fair value.

As of October 31, 2019, approximately \$1.1 billion of our cash, cash equivalents and restricted cash was held outside of the U.S. in our foreign subsidiaries. Our cash and cash equivalents mainly consist of short-term deposits held at major global financial institutions, investments in institutional money market funds, and similar short duration instruments with original maturities of 90 days or less. We continuously monitor the creditworthiness of the financial institutions in which we invest our funds. We utilize a variety of funding strategies in an effort to ensure that our worldwide cash is available in the locations in which it is needed. Most significant international locations have access to internal funding through an offshore cash pool for working capital needs. In addition, a few locations that are unable to access internal funding have access to temporary local overdraft and short-term working capital lines of credit.

We classify investments as short-term investments if their original maturities are greater than three months and their remaining maturities are one year or less.

Fair value of financial instruments. The carrying values of certain of our financial instruments, including cash and cash equivalents, accounts receivable, accounts payable and other accrued liabilities, approximate fair value because of their short maturities. The fair value of long-term equity investments is determined using quoted market prices for those securities when available. For those long-term equity investments accounted for under the equity method or measurement alternative, the carrying value approximates estimated fair value. The fair value of our long-term debt, calculated from quoted prices that are primarily Level 1 inputs under the accounting guidance fair value hierarchy, exceeded the carrying value by approximately \$139 million and \$3 million as of October 31, 2019 and 2018, respectively. The fair value of foreign currency contracts used for hedging purposes is estimated internally by using inputs tied to active markets. These inputs, for example, interest rate yield curves, foreign exchange rates, and forward and spot prices for currencies, are observable in the market or can be corroborated by observable market data for substantially the full term of the assets or liabilities. See also Note 13, "Fair Value Measurements," for additional information on the fair value of financial instruments.

Concentration of credit risk. Financial instruments that potentially subject us to significant concentration of credit risk include money market fund investments, time deposits and demand deposit balances. These investments are categorized as cash and cash equivalents and long-term investments. In addition, we have credit risk from derivative financial instruments used in hedging activities and accounts receivable. We invest in a variety of financial instruments and limit the amount of credit exposure with any one financial institution. We have a comprehensive credit policy in place and credit exposure is monitored on an ongoing basis.

Credit risk with respect to our accounts receivable is diversified due to the large number of entities comprising our customer base and their dispersion across many different industries and geographies. Credit evaluations are performed on customers requiring credit over a certain amount.

Credit risk is mitigated through collateral, such as letters of credit, bank guarantees or payment terms like cash in advance. No single customer accounted for more than 10 percent of accounts receivable as of October 31, 2019 or 2018.

Derivative instruments. We are exposed to global foreign currency exchange rate risk in the normal course of business. We enter into foreign exchange hedging contracts, primarily forward contracts to manage financial exposures resulting from changes in foreign currency exchange rates. Foreign currency exposures include committed and anticipated revenue and expense transactions (cash flow exposure) and assets and liabilities that are denominated in currencies other than the functional currency of the subsidiary (balance sheet exposure). For cash flow hedges, contracts are designed at inception as hedges of the related foreign currency exposures. We formally document all relationships between hedging instruments and hedged items, as well as our risk-management objective and strategy for undertaking various hedge transactions at the inception of the hedge. This process includes linking all derivatives that are designated as cash flow hedges to specific forecasted transactions. We also formally assess, both at the hedge's inception and on an ongoing basis, whether the hedging instruments are highly effective in offsetting changes in cash flows of hedged items. Our foreign exchange hedging contracts generally mature within fourteen months. We do not use derivative financial instruments for speculative trading purposes.

All derivatives are recognized on the balance sheet at their fair values. For derivative instruments that are designated and qualify as a cash flow hedge, changes in the value of the effective portion of the derivative instrument is recognized in accumulated comprehensive income, a component of stockholders' equity. Amounts associated with cash flow hedges are reclassified and recognized in income when either the forecast transaction occurs or it becomes probable the forecast transaction will not occur. Derivatives not designated as hedging instruments are recorded on the balance sheet at fair value, and changes in fair value are recorded in earnings in the current period. Derivative instruments are subject to master netting arrangements and qualify for net presentation in the balance sheet. Cash flows from derivative instruments are classified in the statement of cash flows in the same category as the cash flows from the hedged or economically hedged item, primarily in operating activities.

Property, plant and equipment. Property, plant and equipment are stated at cost less accumulated depreciation. Additions, improvements and major renewals are capitalized; maintenance, repairs and minor renewals are expensed as incurred. When assets are retired or disposed of, the assets and related accumulated depreciation and amortization are removed from our general ledger, and the resulting gain or loss is reflected in the consolidated statement of operations. Buildings and improvements are depreciated over the lesser of their useful lives or the remaining term of the lease and machinery and equipment, which is generally over three years to ten years. We use the straight-line method to depreciate assets.

Leases. We lease buildings, machinery and equipment under operating leases for original terms ranging generally from one year to twelve years. Certain leases contain renewal options for periods up to ten years.

Impairment of long-lived assets. We continually monitor events and changes in circumstances that could indicate carrying amounts of long-lived assets may not be recoverable. When such events or changes in circumstances occur, we assess the recoverability of long-lived assets by determining whether the carrying value of such assets will be recovered through undiscounted expected future cash flows. If the total of the undiscounted future cash flows is less than the carrying amount of those assets, we recognize an impairment loss based on the excess of the carrying amount over the fair value of the assets.

Restructuring costs. The main component of our existing restructuring plans is related to workforce reductions. Workforce reduction charges are accrued when payment of benefits becomes probable and the amounts can be estimated. If the amounts and timing of cash flows from restructuring activities are significantly different from what we have estimated, the actual amount of restructuring and other related charges could be materially different, either higher or lower, than those we have recorded.

Employee compensation and benefits. Amounts owed to employees, such as accrued salary, bonuses and vacation benefits are reported within employee compensation and benefits in the consolidated balance sheet. The total amount of accrued vacation benefit was \$92 million and \$80 million as of October 31, 2019 and 2018, respectively.

Foreign currency translation. We translate and remeasure balance sheet and statement of operations items into U.S. dollars. For those subsidiaries that operate in a local currency functional environment, all assets and liabilities are translated into U.S. dollars using current exchange rates at the balance sheet date; revenue and expenses are translated using monthly exchange rates that approximate average exchange rates in effect during each period. Resulting translation adjustments are reported as a separate component of accumulated other comprehensive income (loss) in stockholders' equity.

For those subsidiaries that operate in a U.S. dollar functional environment, foreign currency assets and liabilities are re-measured into U.S. dollars at current exchange rates except for non-monetary assets and capital accounts, which are remeasured at historical exchange rates. Revenue and expenses are generally remeasured at monthly exchange rates that approximate average exchange rates in effect during each period. Gains or losses from foreign currency re-measurement are included in net income. Net gains or losses resulting from foreign currency transactions are reported in other income (expense) and were a \$2 million loss in 2019, a \$4 million gain in 2018 and a \$1 million gain in 2017.

Retirement plans and post-retirement benefit plan assumptions. Pension accounting is intended to reflect the recognition of future benefit costs over the employees' average expected future service to Keysight based on the terms of the plans and investment and funding decisions. To estimate the impact of these future payments and our decisions concerning funding of these obligations, we are required to make assumptions using actuarial concepts within the framework of GAAP. Two critical assumptions are the discount rate and the expected long-term return on

plan assets. Other important assumptions include expected future salary increases, expected future increases to benefit payments, expected retirement dates, employee turnover, retiree mortality rates and investment portfolio composition. We evaluate these assumptions at least annually. See Note 15, “Retirement Plans and Post-Retirement Benefit Plans.”

2. NEW ACCOUNTING PRONOUNCEMENTS

Accounting Standards Update (“ASU”) 2014-09, Revenue From Contracts With Customers. In May 2014, the Financial Accounting Standards Board (“FASB”) issued ASU 2014-09 and has since modified the standard with several ASUs (collectively, the “new revenue standard” or “ASC 606”). The new revenue standard requires entities to recognize revenue through the application of a five-step model, which includes: identification of the contract, identification of the performance obligations, determination of the transaction price, allocation of the transaction price to the performance obligations, and recognition of revenue as the entity satisfies the performance obligations. We adopted the new revenue standard on November 1, 2018, using the modified retrospective method with the cumulative effect of initially applying the guidance recognized at the date of adoption. Comparative information has not been restated and continues to be reported under the standards in effect for the prior periods presented. We have applied the new revenue standard only to contracts not completed as of the date of adoption, referred to as open contracts. We have elected the practical expedient that permits an entity to reflect the aggregate effect of all modifications (on a contract-by-contract basis) that occurred before the date of adoption in determining the transaction price, identifying the satisfied and unsatisfied performance obligations, and allocating the transaction price to the performance obligations.

The most significant impact of the new revenue standard was our accounting for software license revenue. Historically, we have deferred revenue for certain types of license arrangements and recognize the revenue ratably over the license term. Under the new revenue standard, we are no longer required to establish vendor-specific objective evidence to recognize software license revenue separately from the other elements, and we are required to recognize software license revenue once the customer obtains control of the license, which will generally occur at the start of each license term. The new revenue standard further requires certain costs, primarily sales-related commissions on contracts, to be capitalized rather than expensed. We reclassified our allowance for sales returns from accounts receivable, net to other accrued liabilities due to the adoption of the new revenue standard.

The cumulative effect of initially applying the new revenue standard to all open contracts as of November 1, 2018 was as follows:

	October 31, 2018	Adjustments Due to ASC 606 (in millions)	November 1, 2018
Assets:			
Accounts receivable, net	\$ 624	\$ 7	\$ 631
Inventory	619	—	619
Other current assets	222	28	250
Long-term deferred tax assets	750	(15)	735
Other assets	279	3	282
Liabilities:			
Deferred revenue	\$ 334	\$(53)	\$ 281
Income and other taxes payable	42	1	43
Other accrued liabilities	69	7	76
Long-term deferred revenue	127	(11)	116
Other long-term liabilities	287	3	290
Stockholders’ equity:			
Retained earnings	\$1,212	\$ 76	\$1,288

The following tables summarize the impact of ASC 606 on our condensed consolidated financial statements:

	Year ended October 31, 2019		
	As Reported	Balances Without Adoption of ASC 606 (in millions)	Effect of Change Higher/(Lower)
Net revenue:			
Products	\$3,554	\$3,528	\$ 26
Services and other	749	755	(6)
Total net revenue	<u>4,303</u>	<u>4,283</u>	<u>20</u>
Costs and expenses:			
Cost of products	1,439	1,435	4
Cost of services and other	330	330	—
Total costs	1,769	1,765	4
Research and development	688	688	—
Selling, general and administrative	1,155	1,153	2
Other operating expense (income), net	(20)	(20)	—
Total costs and expenses	<u>3,592</u>	<u>3,586</u>	<u>6</u>
Income from operations	711	697	14
Interest income	23	23	—
Interest expense	(80)	(80)	—
Other income (expense), net	61	61	—
Income before taxes	715	701	14
Provision for income taxes	94	93	1
Net income	<u>\$ 621</u>	<u>\$ 608</u>	<u>\$ 13</u>
Net income per share:			
Basic	\$ 3.31	\$ 3.24	\$0.07
Diluted	\$ 3.25	\$ 3.18	\$0.07

	October 31, 2019		
	As Reported	Balances Without Adoption of ASC 606 (in millions)	Effect of Change Higher/(Lower)
Assets:			
Accounts receivable, net	\$ 668	\$ 642	\$ 26
Inventory	705	709	(4)
Other current assets	244	217	27
Long-term deferred tax assets	755	772	(17)
Other assets	332	328	4
Liabilities:			
Deferred revenue	\$ 334	\$ 389	\$(55)
Income and other taxes payable	55	53	2
Other accrued liabilities	83	73	10
Long-term deferred revenue	176	188	(12)
Other long-term liabilities	295	293	2
Stockholders' equity:			
Retained earnings	\$1,909	\$1,820	\$ 89

ASU 2016-01, Recognition and Measurement of Financial Assets and Financial Liabilities. In January 2016, the FASB issued guidance that amends various aspects of the recognition, measurement, presentation, and disclosure for financial instruments. Most prominent among the changes in the standard is the requirement for changes in the fair value of our equity investments, with certain exceptions, to be recognized in net income rather than other comprehensive income. We adopted the standard effective November 1, 2018 using a modified retrospective approach. We elected to prospectively measure equity investments without readily determinable fair values at cost with adjustments for observable changes in price or impairments. The adoption of this guidance did not have a material impact to our condensed consolidated financial statements.

ASU 2016-02, Leases. In February 2016, the FASB issued guidance that will require substantially all leases to be reported on the balance sheet as right-of-use assets and lease obligations. We expect our leases designated as operating leases in Note 17 will be reported in the consolidated balance sheet upon adoption. Consistent with current GAAP, the recognition, measurement, and presentation of expenses and cash flows arising from a lease by a lessee primarily will depend on its classification as a finance or operating lease. The standard is effective for fiscal years beginning after December 15, 2018 and interim periods within those fiscal years. We will adopt the new standard effective November 1, 2019 using the modified retrospective approach provided by ASU 2018-11, *Leases: Targeted Improvements*, that allows for a cumulative effect adjustment in the period of adoption. We expect to recognize right-of-use assets and corresponding lease obligations of approximately \$145 million to \$165 million. We elected the transition package of practical expedients, which among other things, allows us to carry forward the historical lease classification. We will not elect the practical expedient to use hindsight in determining the lease term and in assessing impairment of right-of-use assets. The company has implemented a leasing software solution and is finalizing changes to our business processes, systems, and controls to support adoption of the new standard.

ASU 2016-15, Classification of Certain Cash Receipts and Cash Payments. In August 2016, the FASB issued guidance that adds or clarifies guidance on eight cash flow classification issues that had been creating diversity in practice. We adopted this guidance during the first quarter of 2019 retrospectively to all periods presented, which resulted in the following change to our previously reported condensed consolidated statement of cash flows for the years ended October 31, 2018 and 2017 related to the classification of acquisition-related contingent consideration.

	Year Ended October 31,					
	2018			2017		
	As Originally Reported	As Adjusted	Change	As Originally Reported	As Adjusted	Change
	(in millions)					
Net cash provided by operating activities.	\$ 555	\$ 555	\$—	\$ 328	\$ 328	\$—
Net cash used in investing activities.	\$(116)	\$(110)	\$ 6	\$(1,722)	\$(1,722)	\$—
Net cash provided by/(used in) financing activities. .	\$(335)	\$(341)	\$(6)	\$ 1,425	\$ 1,425	\$—

ASU 2016-18, Restricted Cash. In November 2016, the FASB issued guidance that requires an entity to include in its cash and cash equivalent balances in the statement of cash flows those amounts that are deemed to be restricted cash and restricted cash equivalents. We adopted this guidance during the first quarter of 2019 retrospectively to all periods presented. See Note 8, “Supplemental Cash Flow Information.”

ASU 2017-07, Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. In March 2017, the FASB issued guidance that requires the service cost component of net periodic pension cost and net periodic post-retirement benefit cost to be included in operating expenses (together with other employee compensation costs) and the other components of the cost to be presented in the statement of operations separately from the service cost component and outside of income from operations. We retrospectively adopted this guidance during the first quarter of 2019. The interest cost, expected return on assets, amortization of prior service credits and other costs have been reclassified from cost of products, research and development, selling, general and administrative, and other operating expenses (income) to other income (expense).

We elected to apply the practical expedient, which allows us to reclassify amounts disclosed previously in our retirement plans and post-retirement benefit plans note as the basis for applying retrospective presentation for comparative periods as it is impractical to determine the disaggregation of the components for amounts capitalized and reclassified in those periods. On a prospective basis, the service cost component of net periodic pension and post-retirement benefit cost is presented with other current compensation costs in operating income. The remaining

components are included in other income (expense) and will not be included in amounts capitalized in inventory or property, plant, and equipment. The effect of the retrospective presentation change related to the retirement plans and post-retirement benefit plans to our previously reported consolidated statement of operations for the years ended October 31, 2018 and 2017 was as follows:

	Year Ended October 31,					
	2018			2017		
	As Originally Reported	As Adjusted	Effect of Change Higher/(Lower)	As Originally Reported	As Adjusted	Effect of Change Higher/(Lower)
	(in millions)					
Cost of products	\$1,440	\$1,449	\$ 9	\$1,206	\$1,210	\$ 4
Cost of services and other	316	318	2	281	282	1
Research and development	607	624	17	498	507	9
Selling, general and administrative	1,185	1,205	20	1,049	1,058	9
Other operating expense (income), net	(33)	(33)	—	(84)	(16)	68
Other income (expense), net	6	54	48	13	104	91

ASU 2017-12, Targeted Improvements to Accounting for Hedging Activities. In August 2017, the FASB issued guidance to enable entities to better portray the economics of their risk management activities in the financial statements and enhance transparency and understandability of hedge results. We adopted this guidance during the first quarter of 2019 and elected to continue to record changes in the fair value of components excluded from the effectiveness assessment of cash flow hedges in earnings. The adoption of this guidance did not have a material impact to our condensed consolidated financial statements.

ASU 2018-02, Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income. In February 2018, the FASB issued guidance that allows a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act (the “Act”) enacted in December 2017. The standard is effective for fiscal years beginning after December 15, 2018. Early adoption is permitted. We adopted this guidance on November 1, 2018. We elected to retain the income tax effects of the Tax Act as a component of accumulated other comprehensive income. Given this election, the adoption of this guidance did not have a material impact on our condensed consolidated financial statements.

ASU 2018-15, Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract. In August 2018, the FASB issued guidance that requires a customer in a cloud computing arrangement (i.e., hosting arrangement) that is a service contract to follow the internal-use software guidance to determine which implementation costs to defer and recognize as an asset and aligns the recognition of implementation costs to those incurred in an arrangement that includes an internal-use software license. Further, new disclosures about implementation costs for both internal-use software and hosting arrangements are required. The standard is effective for fiscal years beginning after December 15, 2019 and interim periods within those fiscal years. Early adoption is permitted. We are evaluating the impact of adopting this guidance on our consolidated financial statements.

Other amendments to GAAP that have been issued by the FASB or other standards-setting bodies that do not require adoption until a future date are not expected to have a material impact on our consolidated financial statements upon adoption.

3. ACQUISITIONS

Acquisition of Prisma

During the third quarter of fiscal 2019, we acquired Prisma Telecom Testing (“Prisma”) for \$88 million, net of \$56 million cash acquired, and recognized additions to goodwill and other intangible assets of \$30 million and \$56 million, respectively, based on the preliminary allocation of the purchase price to the estimated fair values of the assets acquired and liabilities assumed. Prisma is a global provider of radio access network test solutions that is expected to expand Keysight’s comprehensive end-to-end 5G test portfolio for the commercial communications ecosystem. The identified intangible assets primarily consisted of developed technology of \$42 million, with an estimated useful life of 4 years.

Acquisition of Ixia

On April 18, 2017, pursuant to the terms of an Agreement and Plan of Merger dated January 30, 2017 between Keysight and Ixia (the “Merger Agreement”), we acquired all of the outstanding common stock of Ixia for \$1,622 million, net of \$72 million of cash acquired, pursuant to an exchange offer for \$19.65 per share (the “Merger Consideration”). Pursuant to the Merger Agreement, any outstanding and unexercised Ixia stock options with an exercise price below the Merger Consideration and any outstanding Ixia restricted stock awards were cancelled and converted into the right to receive a cash payment equal to the merger consideration of \$19.65 per share (minus the exercise price for the Ixia stock options). The vested portion of the awards associated with prior service of Ixia employees represented approximately \$47 million of the total consideration. We funded the acquisition with a combination of cash and proceeds from debt and equity financings. As a result of the acquisition, Ixia has become a wholly-owned subsidiary of Keysight. Accordingly, the results of Ixia are included in Keysight’s consolidated financial statements from the date of the acquisition and are reported in the Ixia Solutions Group operating segment.

The Ixia acquisition was accounted for in accordance with the authoritative accounting guidance. The acquired assets and assumed liabilities were recorded by Keysight at their estimated fair values. Keysight determined the estimated fair values with the assistance of appraisals or valuations performed by third party specialists, discounted cash flow analysis, and estimates made by management. At the time of acquisition, we expected to leverage and expand the existing sales channels and product development resources and utilize the assembled workforce. The acquisition also offered opportunities for growth through expanded geographic and customer segment diversity and the ability to leverage additional products and capabilities. These factors, among others, contributed to a purchase price in excess of the estimated fair value of Ixia’s net identifiable assets acquired (see summary of net assets below), and, as a result, we have recorded goodwill in connection with this transaction.

All goodwill, approximately \$48 million of which is deductible for tax purposes, was assigned to the Ixia Solutions Group.

A portion of the overall purchase price was allocated to acquired intangible assets. Amortization expense associated with acquired intangible assets is not deductible for tax purposes. Therefore, a deferred tax liability of approximately \$186 million was established primarily for the future amortization of these intangibles and is included in “other long-term liabilities” in the table below.

The following table summarizes the allocation of the purchase price to the estimated fair values of the assets acquired and liabilities assumed on the closing date of April 18, 2017 (in millions):

Cash and cash equivalents	\$ 72
Short-term investments	44
Accounts receivable	91
Inventory	107
Other current assets	34
Property, plant and equipment	50
Goodwill	1,117
Other intangible assets	744
Other assets	<u>4</u>
Total assets acquired	2,263
Accounts payable	(10)
Employee compensation and benefits	(32)
Deferred revenue	(35)
Income and other taxes payable	(1)
Other accrued liabilities	(32)
Other long-term liabilities	<u>(459)</u>
Net assets acquired	<u>\$1,694</u>

The fair values of cash and cash equivalents, short-term investments, accounts receivable, other current assets, accounts payable, employee compensation and benefits, and other accrued liabilities were generally determined using historical carrying values given the short-term nature of these assets and liabilities. The fair values for acquired

inventory, property, plant and equipment, intangible assets, and deferred revenue were determined with the input from third-party valuation specialists. The fair values of certain other assets and certain other liabilities were determined internally using historical carrying values and estimates made by management.

Valuation of Intangible Assets Acquired

The components of intangible assets acquired in connection with the Ixia acquisition were as follows (in millions):

	Estimated Fair Value	Estimated useful life
Developed product technology	\$423	4years
Customer relationships	234	7years
Tradenames and trademarks	12	3years
Backlog	8	90 days
Total intangible assets subject to amortization	677	
In-process research and development	67	
Total intangible assets	<u>\$744</u>	

As noted above, the intangible assets were valued with input from valuation specialists using the income approach, which includes the discounted cash flow, cost-savings, and relief from royalty methods. The in-process research and development was valued using the multi-period excess earnings method under the income approach by discounting forecasted cash flows directly related to the products expecting to result from the projects, net of returns on contributory assets. A discount rate of 14% was used to value the research and development projects, adjusted to reflect additional risks inherent in the acquired projects. The primary in-process projects acquired relate to next generation products which will be released in the near future. Total costs to complete for all Ixia in-process research and development were estimated at approximately \$12 million as of the close date.

Acquisition of ScienLab

On August 31, 2017, we acquired all of the outstanding common stock of ScienLab for \$60 million, net of \$2 million of cash acquired, and recognized additions to goodwill and other intangible assets of \$23 million and \$40 million, respectively. ScienLab is a Germany-based company that provides test solutions to automotive original equipment manufacturers and Tier 1 suppliers in the automotive and energy markets. This acquisition complements our solutions portfolio, allowing end-to-end solutions for hybrid electric vehicles, electric vehicles, and battery test solutions that address e-mobility market needs. The identified intangible assets preliminary consisted of developed technology of \$33 million, with an estimated useful life of 6 years.

Supplemental Pro Forma Information (Unaudited)

The following represents pro forma operating results as if Ixia had been included in the company's consolidated statements of operations as of the beginning of fiscal 2017 (in millions, except per share amounts):

	Year Ended October 31, 2017
Net revenue	\$3,462
Net income	\$ 116
Net income per share - Basic	\$ 0.63
Net income per share - Diluted	\$ 0.62

The unaudited pro forma financial information for the year ended October 31, 2017 combine the historical results of Keysight and Ixia for the year ended October 31, 2017, assuming that the companies were combined as of November 1, 2016. The unaudited pro forma financial information includes business combination accounting effects from the acquisition including amortization and depreciation charges from acquired intangible assets, property plant and equipment, interest expense on the financing transactions used to fund the Ixia acquisition and acquisition-related transaction costs and tax-related effects. Pro forma results of operations for Prisma and ScienLab have not been presented because the effects of the acquisition were not material to the company's financial results.

The pro forma information as presented above is for informational purposes only and is not indicative of the results of operations that would have been achieved if the acquisition had taken place at the beginning of fiscal 2017 for Ixia.

4. REVENUE

Disaggregation of Revenue

We disaggregate our revenue from contracts with customers by geographic region, end market, and timing of transfer of products and services to customers, as we believe these categories best depict how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors. Disaggregated revenue is presented for each of our three reportable segments.

	Year Ended October 31, 2019			
	Communications Solutions Group	Electronic Industrial Solutions Group (in millions)	Ixia Solutions Group	Total
Region				
Americas	\$1,185	\$ 250	\$289	\$1,724
Europe	385	257	71	713
Asia Pacific	<u>1,118</u>	<u>628</u>	<u>120</u>	<u>1,866</u>
Total net revenue	<u>\$2,688</u>	<u>\$1,135</u>	<u>\$480</u>	<u>\$4,303</u>
End Market				
Aerospace, Defense & Government	\$ 975	\$ —	\$ —	\$ 975
Commercial Communications	1,713	—	—	1,713
Electronic Industrial	—	1,135	—	1,135
Ixia	<u>—</u>	<u>—</u>	<u>480</u>	<u>480</u>
Total net revenue	<u>\$2,688</u>	<u>\$1,135</u>	<u>\$480</u>	<u>\$4,303</u>
Timing of Revenue Recognition				
Revenue recognized at a point in time	\$2,452	\$1,037	\$296	\$3,785
Revenue recognized over time	<u>236</u>	<u>98</u>	<u>184</u>	<u>518</u>
Total net revenue	<u>\$2,688</u>	<u>\$1,135</u>	<u>\$480</u>	<u>\$4,303</u>

The timing of revenue recognition, billings and cash collections results in billed accounts receivable, unbilled receivables (contract assets) and deferred revenue (contract liabilities) on our condensed consolidated balance sheet. In addition, we defer and capitalize certain costs incurred to obtain a contract (contract costs).

Contract assets - Contract assets represent unbilled amounts from arrangements for which we have performed by transferring goods or services to the customer in advance of receiving all or partial consideration for such goods and services from the customer. Contract assets arise primarily from service agreements and products delivered pending a formal customer acceptance, which generally occurs within 30 days. The contract assets balance was \$34 million and \$6 million at October 31, 2019 and November 1, 2018, respectively, and is included in “accounts receivables, net” in our condensed consolidated balance sheet.

Contract costs - We recognize an asset for the incremental costs of obtaining a contract with a customer. We have determined that certain employee and third-party representative commissions programs meet the requirements to be capitalized. Employee commissions are based on the achievement of order volume compared to a sales target. Third-party representative commission costs relate directly to a customer contract as the commission is tied to orders contracted through and contracts arranged by our third-party representatives. Without obtaining the contracts, the commissions would not be paid and, as such, are determined to be an incremental cost to obtaining a contract. We only defer these costs when we have determined the commissions are, in fact, incremental and would not have been incurred absent the customer contract.

Capitalized incremental costs are allocated to the individual performance obligations in proportion to the transaction price allocated to each performance obligation and amortized based on the pattern of performance for the underlying performance obligation. Contract costs related to initial contracts and renewals are amortized over the same period because the commissions paid on both the initial contract and renewals are commensurate with one another.

The following table provides a roll-forward of our capitalized contract costs, current and non-current:

	Year Ended October 31, 2019
	(in millions)
Balance at October 31, 2018.....	\$ —
Costs capitalized on November 1, 2018 due to ASC 606 adoption	29
Costs capitalized during the period.....	63
Costs amortized during the period	<u>(64)</u>
Balance at October 31, 2019.....	<u>\$ 28</u>

Contract liabilities - Our contract liabilities consist of deferred revenue that arises when we receive consideration in advance of providing the goods or services promised in the contract. Contract liabilities are primarily generated from customer deposits received in advance of shipments for products or rendering of services and are recognized as revenue when services are provided to the customer. We classify deferred revenue as current or non-current based on the timing of when we expect to recognize revenue. Contract liabilities are recognized as revenue when services are provided to the customer.

Changes in contract liabilities, current and non-current, during 2019 were as follows:

	Year Ended October 31, 2019
	(in millions)
Balance at October 31, 2018.....	\$ 461
Impact of adopting new revenue standard	<u>(64)</u>
Balance at November 1, 2018.....	397
Deferred revenue arising out of acquisitions	1
Deferral of revenue billed in current period, net of recognition	386
Revenue recognized that was deferred as of the beginning of the period	<u>(274)</u>
Balance at October 31, 2019.....	<u>\$ 510</u>

Remaining Performance Obligations

Revenue expected to be recognized in any future period related to remaining performance obligations, excluding revenue pertaining to contracts that have an original expected duration of one year or less, was approximately \$321 million as of October 31, 2019, and represents the company's obligation to deliver products and services and obtain customer acceptance on delivered products. Since we typically invoice customers at contract inception, this amount is included in our current and long-term deferred revenue balances. As of October 31, 2019, we expect to recognize approximately 45% of the revenue related to these unsatisfied performance obligations during 2020, 29% in 2021 and 26% thereafter.

Practical Expedients

As discussed in Note 2, "New Accounting Pronouncements," and previously in this note, we have elected the following practical expedients in accordance with ASC 606:

- We do not disclose the value of remaining performance obligations for contracts with an original expected length of one year or less.
- We determine incremental costs of obtaining a contract for a portfolio of contracts with similar characteristics as we reasonably expect that the effects on the financial statements of applying this guidance to the portfolio would not differ materially from applying this guidance to the individual contracts within that portfolio.

- We exclude from the transaction price certain taxes (e.g., sales, use, value added, and some excise taxes).
- We do not adjust the promised amount of consideration for the effects of a significant financing component if we expect, at contract inception, that the period between when we transfer a promised good or service to a customer and when the customer pays for that good or service will be one year or less.
- We treat shipping and handling costs associated with outbound freight after control of a product has transferred to a customer as a fulfillment cost, included in cost of products.
- We have applied the guidance only to contracts that have not been completed as of the date of adoption (November 1, 2018).
- We did not evaluate individual modifications for those periods prior to the adoption date, but rather evaluated the aggregate effect of all modifications as of the adoption date.

5. SHARE-BASED COMPENSATION

Keysight accounts for share-based awards in accordance with the provisions of the authoritative accounting guidance, which requires the measurement and recognition of compensation expense for all share-based payment awards made to our employees and directors, including Restricted Stock Units (“RSUs”), employee stock purchases made under our Employee Stock Purchase Plan (“ESPP”), employee stock option awards, and performance share awards granted to selected members of our senior management under the Long-Term Performance (“LTP”) Program, based on estimated fair values.

Description of Keysight’s Share-Based Plans

Incentive compensation plans. The 2014 Equity and Incentive Compensation Plan (the “2014 Stock Plan”) was originally adopted by the Board of Directors (“the Board”) on July 16, 2014, subsequently amended and restated by the Board on September 29, 2014 and on January 22, 2015 and became effective as of November 1, 2014 (the “Effective Date”). The Board initially reserved 25 million shares of company common stock that may be issued under the 2014 Stock Plan, plus any shares forfeited or cancelled under the 2014 Stock Plan and subsequently reduced the number to 17 million shares. The Plan was further amended and restated by the Board on November 16, 2017 to increase the maximum aggregate number of shares that may be issued under the Plan to 21.8 million shares. The 2014 Stock Plan provides for the grant of awards in the form of stock options, SARs, restricted stock, RSUs, performance shares and performance units with performance-based conditions on vesting or exercisability, and cash awards. The 2014 Stock Plan has a term of ten years. As of October 31, 2019, approximately 8 million shares were available for future awards under the 2014 Stock Plan.

Stock options granted under the 2014 Stock Plan may be either “incentive stock options,” as defined in Section 422 of the Internal Revenue Code, or non-statutory. Options were granted prior to November 1, 2016 and generally vest at a rate of 25 percent per year over a period of four years from the date of grant with a maximum contractual term of ten years. The exercise price for stock options is generally not less than 100 percent of the fair market value of our common stock on the date the stock award is granted.

Effective November 1, 2014, the Compensation Committee of the Board of Directors approved the performance awards, part of the Long-Term Performance (“LTP”) Program administered under the 2014 Stock Plan, for the company’s executive officers and other key employees. Participants in this program are entitled to receive unrestricted shares of the company’s stock after the end of the contractual period if specified performance targets are met. The maximum contractual period for awards under the performance awards program is three years. These awards can be based on a variety of targets, such as total shareholder return (“TSR”) or financial metrics, such as operating margin, cost synergies and others. The final award may vary from zero to 200 percent of the target award based on the actual performance. For TSR-based performance awards, the peer group comparisons are set at the beginning of the performance period. We consider the dilutive impact of this program in our diluted net income per share calculation only to the extent that the performance conditions are met.

Restricted stock units under our share-based plans are granted to directors, executives and employees. The estimated fair value of the restricted stock unit awards granted under the 2014 Stock Plan is determined based on the market price of Keysight common stock on the date of grant. Restricted stock units generally vest, with some exceptions, at a rate of 25 percent per year over a period of four years from the date of grant.

Effective November 1, 2014, the company adopted the Employee Stock Purchase Plan. The ESPP allows eligible employees to contribute up to ten percent of their base compensation to purchase shares of Keysight common stock

at 85 percent of the closing market price at the purchase date. Shares authorized for issuance in connection with the ESPP are subject to an automatic annual increase of the lesser of one percent of the outstanding shares of Keysight common stock on November 1 or an amount determined by the Compensation Committee of our Board of Directors. Under the terms of the ESPP, in no event shall the number of shares issued under the ESPP exceed 75 million shares.

Under our ESPP, employees purchased 810,172 shares for \$48 million in 2019, 885,110 shares for \$36 million in 2018 and 1,085,382 shares for \$32 million in 2017. As of October 31, 2019, common stock authorized and available for issuance under our ESPP was 20,491,958 shares, which includes shares issued in November 2019 to participants in consideration of the aggregate contribution of \$26 million as of October 31, 2019.

Impact of Share-based Compensation Awards

Share-based compensation expense has been recognized using a straight-line amortization method. The impact of share-based compensation expense on our consolidated statement of operations was as follows:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Cost of products and services	\$14	\$11	\$11
Research and development.	16	10	9
Selling, general and administrative	52	38	36
Total share-based compensation expense.	<u>\$82</u>	<u>\$59</u>	<u>\$56</u>

The expense for the year ended October 31, 2019 includes a mark-to-market adjustment of \$8 million for financial metrics-based performance awards. At October 31, 2019 and 2018, there was no share-based compensation expense capitalized within inventory. The income tax benefit (deficiency) realized from exercised stock options and similar awards recognized was \$9 million in 2019 and \$5 million in 2018 recorded as a component of income tax expense and \$3 million in 2017 recorded as a component of equity.

Valuation Assumptions

The following assumptions were used to estimate the fair value of TSR-based performance awards.

	Year Ended October 31,		
	2019	2018	2017
Volatility of Keysight shares	25%	25%	27%
Volatility of index/peer group	12%	14%	15%
Price-wise correlation with selected peers.	57%	57%	57%

The TSR-based performance awards were valued using a Monte Carlo simulation model, which requires the use of highly subjective and complex assumptions, including the price volatility of the underlying stock. The estimated fair value of restricted stock awards and the financial metrics-based performance awards is determined based on the market price of Keysight's common stock on the grant date. The compensation cost for financial metrics-based performance awards reflect the cost of awards that are probable to vest at the end of the performance period.

Share-based Payment Award Activity

Employee Stock Options: The following table summarizes 2019 activity related to stock option awarded to our employees and directors:

	Options Outstanding	Weighted Average Exercise Price
	(in thousands)	
Outstanding at October 31, 2018	1,306	\$27
Granted.	—	\$—
Exercised	(747)	\$27
Forfeited and expired	—	\$—
Outstanding at October 31, 2019	<u>559</u>	\$28

There were no forfeited or expired options in 2019.

The options outstanding and exercisable at October 31, 2019 were as follows:

Range of Exercise Prices	Options Outstanding and Exercisable			
	Number Outstanding	Weighted Average Remaining Contractual Life	Weighted Average Exercise Price	Aggregate Intrinsic Value
	(in thousands)	(in years)		(in thousands)
\$0 – 25	154	2.7	\$20	\$12,479
\$25.01 - 30	164	4.1	\$30	11,652
\$30.01 - 40	<u>241</u>	5.0	\$31	<u>16,830</u>
	<u>559</u>	4.1	\$28	<u>\$40,961</u>

The aggregate intrinsic value provided above represents the total pre-tax intrinsic value, based on Keysight's closing stock price of \$100.91 at October 31, 2019, that would have been received had all award holders exercised their awards that were in-the-money as of that date. The total number of in-the-money awards exercisable at October 31, 2019 was approximately 0.6 million.

The following table summarizes the aggregate intrinsic value of options exercised in 2019, 2018 and 2017:

	Aggregate Intrinsic Value	Weighted Average Exercise Price
	(in thousands)	
Options exercised in fiscal 2017.....	\$16,385	\$20
Options exercised in fiscal 2018.....	\$28,985	\$26
Options exercised in fiscal 2019.....	\$39,094	\$27

As of October 31, 2019, the unrecognized share-based compensation costs for outstanding stock option awards was zero. See Note 6, "Income Taxes," for the tax impact on share-based award exercises.

Non-vested Awards

The following table summarizes non-vested award activity in 2019 for our LTP Program and restricted stock unit awards:

	Shares	Weighted Average Grant Date Fair Value
	(in thousands)	
Non-vested at October 31, 2018.....	3,359	\$36
Granted.....	1,116	\$60
Vested.....	(1,439)	\$38
Forfeited.....	(53)	\$46
LTP Program incremental.....	<u>298</u>	\$36
Non-vested at October 31, 2019.....	<u>3,281</u>	\$48

As of October 31, 2019, the unrecognized share-based compensation cost for non-vested stock awards was approximately \$57 million, which is expected to be amortized over a weighted average period of 2.3 years. The total fair value of stock awards vested was \$89 million for 2019, \$55 million for 2018 and \$43 million for 2017.

6. INCOME TAXES

The domestic and foreign components of income (loss) before taxes are:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
U.S. operations	\$ 20	\$(532)	\$(147)
Non-U.S. operations	<u>695</u>	<u>121</u>	<u>326</u>
Total income (loss) before taxes	<u>\$715</u>	<u>\$(411)</u>	<u>\$ 179</u>

The provision (benefit) for income taxes is comprised of:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
U.S. federal taxes:			
Current	\$10	\$ 131	\$ 21
Deferred	(8)	46	(56)
Non-U.S. taxes:			
Current	91	75	101
Deferred	14	(832)	9
State taxes, net of federal benefit:			
Current	(5)	7	2
Deferred	<u>(8)</u>	<u>(3)</u>	<u>—</u>
Total provision (benefit) for income taxes	<u>\$94</u>	<u>\$(576)</u>	<u>\$ 77</u>

Due to the adoption of ASU 2016-09, excess tax benefits and deductions associated with our various share-based award plans are included as components of income tax expense for fiscal years 2019 and 2018. The income tax provision for fiscal year 2017 does not reflect potential future tax savings resulting from excess deductions associated with our various share-based award plans.

The significant components of deferred tax assets and deferred tax liabilities included in the consolidated balance sheet are:

	October 31,			
	2019		2018	
	Deferred Tax Assets	Deferred Tax Liabilities	Deferred Tax Assets	Deferred Tax Liabilities
	(in millions)			
Inventory	\$ 10	\$ (2)	\$ 14	\$ —
Intangibles	630	(38)	664	(66)
Property, plant and equipment	17	(24)	14	(23)
Warranty reserves	9	(1)	11	(1)
Pension benefits	86	(76)	47	(67)
Employee benefits, other than retirement	29	(1)	27	(1)
Net operating loss, capital loss, and credit carryforwards	116	—	120	—
Unremitted earnings of foreign subsidiaries	—	(12)	—	(5)
Share-based compensation	15	—	14	—
Deferred revenue	25	(5)	37	(1)
Other	<u>14</u>	<u>(12)</u>	<u>11</u>	<u>(1)</u>
Subtotal	951	(171)	959	(165)
Tax valuation allowance	<u>(73)</u>	<u>—</u>	<u>(79)</u>	<u>—</u>
Total deferred tax assets or deferred tax liabilities	<u>\$878</u>	<u>\$(171)</u>	<u>\$880</u>	<u>\$(165)</u>

The decrease in deferred tax assets in 2019 as compared to 2018 primarily relates to a decrease in intangible assets in Singapore due to amortization, partially offset by an increase in future pension liabilities in the U.S. and Germany. The increase in deferred tax liabilities in 2019 as compared to 2018 primarily relates an increase in future tax liabilities in Italy from a restructuring and a decrease in future pension liabilities in the U.K. and Japan, partially offset by a decrease in intangible assets in the U.S. due to amortization and a decrease in Germany due to a restructuring.

As of October 31, 2019, there was a deferred tax liability of \$12 million for the tax liability expected to be imposed upon the repatriation of unremitted foreign earnings that are not considered indefinitely reinvested. As of October 31, 2019, the cumulative amount of undistributed earnings considered indefinitely reinvested was \$88 million. No deferred tax liability has been recognized on the basis difference created by such earnings since it is our intention to indefinitely reinvest those earnings in the company's foreign operations. The amount of the unrecognized deferred tax liability on the indefinitely reinvested earnings was \$4 million.

Valuation allowances require an assessment of both positive and negative evidence when determining whether it is more likely than not that deferred tax assets are recoverable. Such assessment is required on a jurisdiction by jurisdiction basis.

The \$73 million valuation allowance as of October 31, 2019 is mainly related to capital losses in the U.K., net operating losses in the Netherlands and U.K., and California research credits. The \$79 million valuation allowance as of October 31, 2018 was mainly related to California research credits, capital losses in the U.K., and net operating losses in the U.K. and Netherlands. The decrease in valuation allowance from October 31, 2018 to October 31, 2019 is primarily due to a reversal of valuation allowance on a portion of the California research credits. We will maintain a valuation allowance until sufficient positive evidence exists to support reversal.

At October 31, 2019, we had U.S. federal net operating loss carryforwards of approximately \$8 million, acquired in the Ixia acquisition, and U.S. state net operating loss carryforwards, primarily acquired in the Ixia acquisition, of approximately \$68 million. The U.S. federal net operating losses will expire in years beginning 2026 through 2029, if not utilized. The U.S. state net operating loss carryforwards will begin to expire in 2025, if not utilized. At October 31, 2019, we had California research credit carryforwards of approximately \$20 million. The California research credits can be carried forward indefinitely. The U.S. federal and state net operating losses and tax credit carryforwards are subject to change of ownership limitations provided by the Internal Revenue Code and similar state provisions. At October 31, 2019, we also had foreign net operating loss carryforwards of approximately \$305 million. Of this amount, \$116 million will expire in years beginning 2023 through 2029 if not utilized. The remaining \$189 million has an indefinite life. At October 31, 2019, we had foreign capital loss carryforwards of approximately \$145 million, primarily acquired in the Anite acquisition, with an indefinite life and \$3 million of tax credits in foreign jurisdictions with an indefinite life. Some of the foreign losses are subject to annual loss limitation rules. These annual loss limitations in foreign jurisdictions may result in the expiration or reduced utilization of the net operating losses.

The differences between the U.S. federal statutory income tax rate and our effective tax rate are:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Profit(loss) before tax times statutory rate.....	\$150	\$ (96)	\$ 63
State income taxes, net of federal benefit	(6)	2	1
US tax on non-US entity income	48	210	5
US benefit on foreign sales.....	(13)	—	—
U.S. research credits	(12)	(10)	(7)
Non-US income taxed at different rates.....	(70)	16	(83)
Change in unrecognized tax benefits	(12)	86	23
Share-based compensation	(5)	(1)	7
Singapore tax incentive and amortization	—	(591)	—
Reversal of deferred taxes on foreign earnings not considered indefinitely reinvested. . .	—	(304)	—
Goodwill impairment.....	—	99	—
U.S. federal statutory tax rate change	—	10	—

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Malaysia tax assessment	—	—	68
Other, net	14	3	—
Provision (benefit) for income taxes	\$94	\$(576)	\$77
Effective tax rate	13%	140%	43%

We benefit from tax incentives in several jurisdictions, most significantly in Singapore, that have granted us tax incentives that require renewal at various times in the future. The tax incentives provide lower rates of taxation on certain classes of income and require thresholds of investments and employment or specific types of income in those jurisdictions. The tax incentives are due for renewal between 2024 and 2025. The impact of the tax incentives decreased income taxes by \$47 million, \$567 million and \$49 million in 2019, 2018 and 2017, respectively. The benefit of the tax incentives on net income per share (diluted) was approximately \$0.25, \$2.97 and \$0.27 in 2019, 2018 and 2017, respectively. The decrease in the tax benefit from 2018 to 2019 is primarily due to the one-time impacts included in 2018 of the Singapore restructuring and tax incentive modifications that were completed in that year in response to Singapore tax law changes. Of the \$2.97 benefit from the tax incentives on net income per share (diluted) in 2018, \$2.75 relates to one-time items resulting from the Singapore restructuring.

For 2019, the effective tax rate was 13 percent, which is lower than the U.S. statutory rate primarily due a higher percentage of earnings in the non-US jurisdictions taxed at lower statutory rates.

For 2018, the effective tax rate was 140 percent, which is higher than the U.S. statutory rate primarily due to the impact of U.S. tax law changes, the Singapore restructuring and tax incentive modifications completed in 2018 in response to Singapore tax law changes, and the tax impact of goodwill impairment.

For 2017, the effective tax rate was 43 percent, which is higher than the U.S. statutory rate primarily due to the payment of a prior year Malaysia tax assessment of \$68 million, including tax and penalties, which we are currently in the process of appealing to the Special Commissioners of Income Tax (“SCIT”) in Malaysia.

The breakdown between current and long-term income tax assets and liabilities, excluding deferred tax assets and liabilities, was as follows for the years 2019 and 2018:

	October 31,	
	2019	2018
	(in millions)	
Current income tax assets (included within other current assets)	\$ 40	\$ 32
Current income tax liabilities (included within income and other taxes payable)	(35)	(18)
Long-term income tax assets (included within other assets)	—	—
Long-term income tax liabilities (included within other long-term liabilities)	(198)	(205)
Total	<u>\$(193)</u>	<u>\$(191)</u>

The calculation of our tax liabilities involves uncertainties in the application of complex tax law and regulations in a multitude of jurisdictions. Although the guidance on the accounting for uncertainty in income taxes prescribes the use of a recognition and measurement model, the determination of whether an uncertain tax position has met those thresholds will continue to require significant judgment by management. In accordance with the guidance on the accounting for uncertainty in income taxes, for all U.S. and other tax jurisdictions, we recognize potential liabilities for anticipated tax audit issues based on our estimate of whether, and the extent to which, additional taxes and interest will be due. The ultimate resolution of tax uncertainties may differ from what is currently estimated, which could result in a material impact on income tax expense. If our estimate of income tax liabilities proves to be less than the ultimate assessment, a further charge to expense would be required. If the payment of these additional amounts ultimately proves to be unnecessary, the reversal of the liabilities would result in tax benefits being recognized in the period when we determine the liabilities are no longer necessary. We include interest and penalties related to unrecognized tax benefits within the provision for income taxes in the consolidated statements of operations. Accrued interest and penalties are included on the related tax liability line in the consolidated balance sheet.

The aggregate changes in the balances of our unrecognized tax benefits including all federal, state and foreign tax jurisdictions are as follows:

	<u>2019</u>	<u>2018</u>	<u>2017</u>
	(in millions)		
Gross Balance, beginning of year.....	\$234	\$146	\$ 51
Additions due to acquisition.....	9	—	22
Additions for tax positions related to the current year.....	18	100	31
Additions for tax positions from prior years.....	—	2	52
Reductions for tax positions from prior years.....	(32)	(1)	(9)
Settlements with taxing authorities.....	—	(12)	—
Statute of limitations expirations.....	(3)	(1)	(1)
Gross Balance, end of year.....	<u>\$226</u>	<u>\$234</u>	<u>\$146</u>

As of October 31, 2019, the total amount of gross unrecognized tax benefits was \$226 million, that, if recognized, \$216 million would impact our effective tax rate. However, approximately \$9 million of the unrecognized tax benefits were related to acquisitions, which if recognized within certain agreed upon time periods, would be offset due to an indemnification asset recognized. As of October 31, 2018, the total amount of gross unrecognized tax benefits was \$234 million, that, if recognized, \$227 million would impact our effective tax rate.

We recognized tax expense of \$2 million, \$2 million, and \$18 million of interest and penalties related to unrecognized tax benefits in 2019, 2018 and 2017, respectively. We recorded an additional \$4 million of interest and penalties related to unrecognized tax benefits in 2019 through purchase accounting related to acquisitions. Cumulatively, interest and penalties accrued as of the end of October 31, 2019, 2018 and 2017 were \$28 million, \$22 million and \$20 million, respectively.

The open tax years for the IRS and most states are from November 1, 2015 through the current tax year. For the majority of our foreign entities, the open tax years are from November 1, 2014 through the current tax year. For certain foreign entities, the tax years remain open, at most, back to the year 2008. Given the number of years and numerous matters that remain subject to examination in various tax jurisdictions, we are unable to estimate the range of possible changes to the balance of our unrecognized tax benefits.

The company is being audited in Malaysia for the 2008 tax year. Although this tax year pre-dates our spin-off from Agilent, pursuant to the agreement between Agilent and Keysight pertaining to tax matters, as finalized at the time of separation, for certain entities including Malaysia, any historical tax liability is the responsibility of Keysight. In the fourth quarter of fiscal 2017, Keysight paid income taxes and penalties of \$68 million on gains related to intellectual property rights, although we are currently in the process of appealing to the SCIT in Malaysia. The company believes there are numerous defenses to the current assessment; the statute of limitations for the 2008 tax year in Malaysia is closed and the income in question is exempt from tax in Malaysia. The company is disputing this assessment and pursuing all avenues to resolve this issue favorably for the company.

7. NET INCOME PER SHARE

The following is a reconciliation of the numerator and denominator of the basic and diluted net income per share computations.

	<u>Year Ended October 31,</u>		
	<u>2019</u>	<u>2018</u>	<u>2017</u>
	(in millions)		
Numerator:			
Net income.....	<u>\$621</u>	<u>\$165</u>	<u>\$102</u>
Denominator:			
Basic weighted-average shares.....	188	187	180
Potential common shares—stock options and other employee stock plans.....	<u>3</u>	<u>4</u>	<u>2</u>
Diluted weighted-average shares.....	<u>191</u>	<u>191</u>	<u>182</u>

The dilutive effect of share-based awards is reflected in diluted net income per share by application of the treasury stock method, which includes consideration of unamortized share-based compensation expense and the dilutive effect of in-the-money options and non-vested restricted stock units. Under the treasury stock method, the amount the employee must pay for exercising stock options and unamortized share-based compensation expense are collectively assumed to be used to repurchase hypothetical shares. The increase in diluted weighted average shares for the year ended October 31, 2018 includes 5 million shares attributed to the weighted impact of 13 million shares of common stock issued in March 2017.

We exclude stock options with exercise prices greater than the average market price of our common stock from the calculation of diluted earnings per share because their effect would be anti-dilutive. For the years ended 2019, 2018 and 2017, we excluded zero shares from the calculation of diluted earnings per share. In addition, we also exclude from the calculation of diluted earnings per share, stock options, ESPP, LTP Program and restricted stock awards, whose combined exercise price and unamortized fair value collectively were greater than the average market price of our common stock because their effect would also be anti-dilutive. The impact was immaterial in 2019, 2018 and 2017.

8. SUPPLEMENTAL CASH FLOW INFORMATION

Net cash paid for income taxes was \$103 million in 2019, \$27 million in 2018 and \$121 million in 2017. Higher tax payments in 2019 were primarily due to increased net income and payments on the tax liability established in 2018 related to new U.S. tax legislation. The 2017 payments include \$68 million paid to the Malaysia tax authority associated with a tax assessment on gains related to intellectual property transfers that we are currently in the process of appealing to the Special Commissioners of Income Tax in Malaysia.

Cash paid for interest was \$76 million in 2019, \$79 million in 2018 and \$64 million in 2017. In 2017 we also paid fees of \$9 million in connection with a bridge loan facility that were amortized to interest expense and classified as a financing activity in our consolidated statement of cash flows.

The following table summarizes our non-cash investing activities that are not reflected in the consolidated statement of cash flows:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Non-cash investing activities:			
Increase (decrease) in unpaid capital expenditures in accounts payable	\$ (3)	\$10	\$ (4)
Increase in capital lease liabilities	<u>—</u>	<u>—</u>	<u>4</u>
	<u>\$ (3)</u>	<u>\$10</u>	<u>\$—</u>

The following table provides a reconciliation of cash, cash equivalents and restricted cash reported within the consolidated balance sheet to the amount shown in the consolidated statement of cash flows:

	October 31, 2019	October 31, 2018
	(in millions)	
Cash and cash equivalents	\$1,598	\$913
Restricted cash included in other current assets	—	2
Restricted cash included in other assets	<u>2</u>	<u>2</u>
Total cash, cash equivalents, and restricted cash shown in the statement of cash flows ..	<u>\$1,600</u>	<u>\$917</u>

Restricted cash consisted primarily of deposits held as collateral against bank guarantees.

9. INVENTORY

	October 31,	
	2019	2018
	(in millions)	
Finished goods	\$317	\$283
Purchased parts and fabricated assemblies	<u>388</u>	<u>336</u>
Total inventory	<u>\$705</u>	<u>\$619</u>

Inventory-related excess and obsolescence charges recorded in total cost of products were \$27 million in 2019, \$25 million in 2018 and \$16 million in 2017. We record excess and obsolete inventory charges for inventory at our sites as well as inventory at our contract manufacturers and suppliers, where we have non-cancellable purchase commitments.

10. PROPERTY, PLANT AND EQUIPMENT, NET

	October 31,	
	2019	2018
	(in millions)	
Land	\$ 65	\$ 63
Buildings and leasehold improvements	721	695
Machinery and equipment	1,137	1,074
Total property, plant and equipment	1,923	1,832
Accumulated depreciation and amortization	(1,347)	(1,277)
Property, plant and equipment, net	<u>\$ 576</u>	<u>\$ 555</u>

Asset impairments were zero in 2019, 2018 and 2017. Depreciation expense was \$96 million in 2019, \$103 million in 2018 and \$92 million in 2017. Buildings and leasehold improvements include assets held under capital lease of \$4 million and \$4 million at October 31, 2019 and 2018, respectively.

In 2014 we entered into a binding contract to sell land in the United Kingdom that resulted in the transfers of three separate land tracts from 2014 through 2017 totaling approximately \$34 million. In 2017 we recognized a gain of \$8 million on the sale of the land tracts in other operating expense (income).

11. GOODWILL AND OTHER INTANGIBLE ASSETS

The goodwill balances as of October 31, 2019, 2018 and 2017 and the movements in 2019 and 2018 for each of our reportable segments were as follows:

	Communications Solutions Group	Electronic Industrial Solutions Group	Ixia Solutions Group	Total
	(in millions)			
Goodwill at October 31, 2017	\$497	\$268	\$1,117	\$1,882
Foreign currency translation impact	(2)	(2)	(1)	(5)
Goodwill arising from acquisitions	4	2	—	6
Impairment losses	—	—	(709)	(709)
Divestitures	(2)	(1)	—	(3)
Goodwill at October 31, 2018	497	267	407	1,171
Foreign currency translation impact	8	—	—	8
Goodwill arising from acquisitions	30	—	—	30
Goodwill at October 31, 2019	<u>\$535</u>	<u>\$267</u>	<u>\$ 407</u>	<u>\$1,209</u>
Goodwill	\$535	\$267	\$1,116	\$1,918
Accumulated impairment losses	—	—	(709)	(709)
Goodwill at October 31, 2019	<u>\$535</u>	<u>\$267</u>	<u>\$ 407</u>	<u>\$1,209</u>

Other intangible assets as of October 31, 2019 and 2018 consisted of the following:

	Other Intangible Assets as of October 31, 2019			Other Intangible Assets as of October 31, 2018		
	Gross Carrying Amount	Accumulated Amortization	Net Book Value	Gross Carrying Amount	Accumulated Amortization	Net Book Value
	(in millions)					
Developed technology	\$ 876	\$578	\$298	\$ 835	\$415	\$420
Backlog	13	13	—	13	13	—
Trademark/Tradename	34	21	13	33	14	19
Customer relationships	316	139	177	304	100	204
Non-compete agreements	<u>1</u>	<u>1</u>	<u>—</u>	<u>1</u>	<u>—</u>	<u>1</u>
Total amortizable intangible assets	1,240	752	488	1,186	542	644
In-Process R&D	<u>2</u>	<u>—</u>	<u>2</u>	<u>1</u>	<u>—</u>	<u>1</u>
Total	<u>\$1,242</u>	<u>\$752</u>	<u>\$490</u>	<u>\$1,187</u>	<u>\$542</u>	<u>\$645</u>

In 2019 we recorded additions to goodwill and other intangible assets of \$30 million and \$56 million, respectively, due to the acquisition of Prisma. For additional information on the acquisition of Prisma, see Note 3, “Acquisitions.”

In 2018 we recorded additions to goodwill of \$6 million due to an acquisition and a \$3 million reduction due to divestiture-related activity. In 2018 we transferred \$23 million from in-process R&D to developed technology as projects were successfully completed. In 2018 we recorded an impairment charge of \$5 million related to the cancellation of an in-process R&D project.

There was a \$1 million foreign exchange translation impact to other intangible assets in 2019 and 2018.

Amortization of other intangible assets was \$210 million in 2019, \$204 million in 2018 and \$131 million in 2017. Estimated intangible assets amortization expense for each of the five succeeding fiscal years is as follows:

	Amortization expense (in millions)
2020	\$211
2021	143
2022	67
2023	49
2024	17
Thereafter	1

We test goodwill for impairment annually in the fourth quarter of each year, after the annual update to our long-term financial forecasts during our strategic planning cycle, using data as of September 30 of that year. The impairment test compares the fair value of a reporting unit with its carrying amount, with an impairment charge recorded for the amount by which the carrying amount exceeds the reporting unit’s fair value up to a maximum amount of the goodwill balance for the reporting unit. We determine fair values for each of the reporting units using the market approach, when available and appropriate, or the income approach, or a combination of both. If multiple valuation methodologies are used, the results are weighted accordingly.

Valuations using the market approach are derived from metrics of publicly traded comparable companies. The selections of comparable businesses are based on the markets in which our reporting units operate, giving consideration to risk profiles, size, geography, and diversity of products and services.

Under the income approach, fair value is determined based on the present value of estimated future cash flows, discounted at an appropriate risk-adjusted rate. We use our internal forecasts to estimate future cash flows and include an estimate of long-term future growth rates based on our most recent views of the long-term outlook for each business.

In 2018 we performed our annual impairment test of goodwill for all our reporting units using a qualitative approach, except for our Ixia Solutions Group (“ISG”) reporting unit, which is the only reporting unit in the ISG reportable segment, for which the test was performed using a quantitative approach since their revenue and earnings had not been consistent with originally projected results, thus requiring a reduction of our long-term financial forecasts included in our revised strategic plan. The income and market approaches were used to determine the fair value of the ISG reporting unit. With respect to the income approach, the discounted cash flow method was used, which included an eight-year future cash flow projection and an estimated terminal value. The market approach used revenue and EBITDA multiples to develop an estimate of fair value. A weighting of 60 percent and 40 percent was applied to the income and market approaches, respectively, to determine the fair value of the ISG reporting unit. The income approach was given a larger weighting based on the underlying detailed financial projections prepared during the strategic planning cycle which reflect the financial and operational facts and circumstances specific to ISG as of the valuation date. Based on the results of our testing, the fair value of our ISG reporting unit did not exceed the carrying value. The primary factors contributing to a reduction in fair value of ISG were weaker-than-expected market growth rates since acquisition and significant integration efforts in 2018 resulting in lower revenue and profitability trends included in our long-term financial forecasts. As a result, we recorded an impairment loss of \$709 million for ISG in 2018.

During the fourth quarter of 2019, we performed our annual impairment test of goodwill for all our reporting units using a qualitative approach, except for our ISG reporting unit, which is the only reporting unit in the ISG reportable segment, for which the test was performed using a quantitative approach. The income and market approaches were used to determine the fair value of the ISG reporting unit. With respect to the income approach, the discounted cash flow method was used, which included an eight-year future cash flow projection and an estimated terminal value. The market approach used revenue and EBITDA multiples to develop an estimate of fair value. A weighting of 60 percent and 40 percent was applied to the income and market approaches, respectively, to determine the fair value of the ISG reporting unit. The income approach was given a larger weighting based on the underlying detailed financial projections prepared during the strategic planning cycle that reflect the financial and operational facts and circumstances specific to ISG as of the valuation date. Based on the results of our annual impairment tests, the fair value of each of our reporting units exceeded the carrying value.

As of October 31, 2019, we determined that no goodwill impairment exists, and that the remaining goodwill is recoverable for all of our reporting units; however, there can be no assurance that additional goodwill will not be impaired in future periods. Estimating the fair value of reporting units requires the use of estimates and significant judgments that are based on a number of factors including actual operating results. It is possible that the judgments and estimates described above could change in future periods.

We review long-lived assets for impairment whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable or that the useful lives of these assets are no longer appropriate. We performed an impairment test of ISG’s intangible assets in 2019 and 2018 and concluded that no impairment charge was required.

12. INVESTMENTS

The net book value of investments as of October 31, 2019 and 2018 was as follows:

	<u>October 31,</u>	
	<u>2019</u>	<u>2018</u>
	<u>(in millions)</u>	
Long-Term		
Equity investments	\$37	\$30
Equity investments - other	9	16
Total	<u>\$46</u>	<u>\$46</u>

Equity investments are reported at fair value, with gains or losses resulting from changes in fair value recognized in earnings. Equity investments without readily determinable fair values that are measured at cost adjusted for observable changes in price or impairments are presented as “Equity investments - other” in the table above.

All of our investments are subject to periodic impairment review. The impairment analysis requires significant judgment to identify events or circumstances that would likely have a significant adverse effect on the future value of the investment. There was no impairment recognized in 2019, 2018 and 2017. Realized gains and losses from the sale of investments are recorded in earnings.

Net recognized gains (losses) on equity investments were as follows:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Net realized gains on investments sold	\$1	\$—	\$—
Net unrealized gains on investments still held.	6	—	2

Prior to adoption of ASU 2016-01 effective November 1, 2018 using a modified retrospective approach, the unrealized gain or loss resulting from a change in the fair value of our equity investments was recognized in accumulated other comprehensive income and was a loss of \$17 million for 2018 and a gain of \$5 million for 2017. During the year ended October 31, 2019, we received proceeds of \$7 million from the sale of an investment, classified as “Equity investments – other,” which was sold at cost.

13. FAIR VALUE MEASUREMENTS

The authoritative guidance defines fair value as the price that would be received from selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining the fair value measurements for assets and liabilities required or permitted to be recorded at fair value, we consider the principal or most advantageous market and assumptions that market participants would use when pricing the asset or liability.

Fair Value Hierarchy

The guidance establishes a fair value hierarchy that prioritizes inputs used in valuation techniques into three levels. A financial instrument’s categorization within the fair value hierarchy is based upon the lowest level of input that is significant to the fair value measurement. There are three levels of inputs that may be used to measure fair value:

Level 1 — applies to assets or liabilities for which there are quoted prices in active markets for identical assets or liabilities.

Level 2 — applies to assets or liabilities for which there are inputs other than quoted prices included within Level 1 that are observable, either directly or indirectly, for the asset or liability such as: quoted prices for similar assets or liabilities in active markets; quoted prices for identical or similar assets or liabilities in less active markets; or other inputs that can be derived principally from, or corroborated by, observable market data.

Level 3 — applies to assets or liabilities for which there are unobservable inputs to the valuation methodology that are significant to the measurement of the fair value of the assets or liabilities.

Financial Assets and Liabilities Measured at Fair Value on a Recurring Basis

Financial assets and liabilities measured at fair value on a recurring basis as of October 31, 2019 and 2018 were as follows:

	Fair Value Measurements as of October 31, 2019					Fair Value Measurements as of October 31, 2018				
	<u>Total</u>	<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>	<u>Other</u>	<u>Total</u>	<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>	<u>Other</u>
	(in millions)									
Assets:										
<i>Short-term</i>										
Cash equivalents										
Money market funds.	\$932	\$932	\$—	\$—	\$—	\$484	\$484	\$—	\$—	\$—
Derivative instruments (foreign exchange contracts)	2	—	2	—	—	6	—	6	—	—

	Fair Value Measurements as of October 31, 2019					Fair Value Measurements as of October 31, 2018				
	Total	Level 1	Level 2	Level 3	Other	Total	Level 1	Level 2	Level 3	Other
	(in millions)									
<i>Long-term</i>										16
Equity investments	37	37	—	—	—	30	30	—	—	—
Equity investments - other	9	—	—	—	9	16	—	—	—	16
Total assets measured at fair value	<u>\$980</u>	<u>\$969</u>	<u>\$ 2</u>	<u>\$—</u>	<u>\$ 9</u>	<u>\$536</u>	<u>\$514</u>	<u>\$ 6</u>	<u>\$—</u>	<u>\$16</u>
Liabilities:	—									
<i>Short-term</i>										
Derivative instruments (foreign exchange contracts)	\$ 6	\$ —	\$ 6	\$—	\$—	\$ 6	\$ —	\$ 6	\$—	\$—
<i>Long-term</i>										—
Deferred compensation liability	14	—	14	—	—	13	—	13	—	—
Total liabilities measured at fair value	<u>\$ 20</u>	<u>\$ —</u>	<u>\$20</u>	<u>\$—</u>	<u>\$—</u>	<u>\$ 19</u>	<u>\$ —</u>	<u>\$19</u>	<u>\$—</u>	<u>\$—</u>

Our money market funds and equity investments with readily determinable fair values are measured at fair value using quoted market prices and, therefore, are classified within Level 1 of the fair value hierarchy. Equity investments without readily determinable fair values that are measured at cost adjusted for observable changes in price or impairments are not categorized in the fair value hierarchy and are presented as “Equity investments — other” in the tables above. Our deferred compensation liability is classified as Level 2 because the inputs used in the calculations are observable, although the values are not directly based on quoted market prices. Our derivative financial instruments are classified within Level 2 as there is not an active market for each hedge contract, but the inputs used to calculate the value of the instruments are tied to active markets.

Equity investments including securities that are earmarked to pay the deferred compensation liability and the deferred compensation liability are reported at fair value, with gains or losses resulting from changes in fair value recognized in earnings. Certain derivative instruments are reported at fair value, with unrealized gains and losses, net of tax, included in accumulated other comprehensive income (loss).

Financial Assets and Liabilities Measured at Fair Value on a Non-Recurring Basis

Assets measured at fair value on a non-recurring basis consisted of goodwill and intangible assets for our Ixia Solutions Group reporting unit. Refer to Note 11, “Goodwill and Other Intangible Assets” for more information.

Goodwill

Fair value assessments of the reporting unit and the reporting unit’s net assets, which are performed for goodwill impairments tests, are considered Level 3 measurements due to the significance of unobservable inputs developed using company-specific information. We considered a market approach as well as an income approach using the discounted cash flow model to determine the fair value of the reporting unit.

Intangible Assets

We utilized an income approach for estimating the fair value of intangible assets. The future cash flows used in the analysis are based on internal cash flow projections based on our long-range plans and include significant assumptions by management. Accordingly, the fair value assessment of the long-lived assets is considered a Level 3 fair value measurement.

14. DERIVATIVES

We are exposed to foreign currency exchange rate fluctuations and interest rate changes in the normal course of our business. As part of our risk management strategy, we use derivative instruments, primarily forward contracts to hedge economic and/or accounting exposures resulting from changes in foreign currency exchange rates.

Cash Flow Hedges

We enter into foreign exchange contracts to hedge our forecasted operational cash flow exposures resulting from changes in foreign currency exchange rates. These foreign exchange contracts, carried at fair value, have maturities

between one and fourteen months. These derivative instruments are designated and qualify as cash flow hedges under the criteria prescribed in the authoritative guidance. The changes in the value of the derivative instrument included in the assessment of effectiveness are recognized in accumulated other comprehensive income and reclassified into earnings when the forecasted transaction occurs in the same financial statement line item in the consolidated statement of operations where the earnings effect of the hedged item is presented. If it becomes probable that the forecasted transaction will not occur, the hedge relationship will be de-designated and amounts accumulated in other comprehensive income will be reclassified into earnings in the current period. Gains and losses on the derivative instrument representing hedge components excluded from the assessment of effectiveness are recognized immediately in earnings and are presented in the same financial statement line of the consolidated statement of operations where the earnings effect of the hedged item is presented.

Other Hedges

Additionally, we enter into foreign exchange contracts to hedge monetary assets and liabilities that are denominated in currencies other than the functional currency of our subsidiaries. These foreign exchange contracts are carried at fair value and do not qualify for hedge accounting treatment and are not designated as hedging instruments. Changes in value of the derivative are recognized in other income (expense), net, in the consolidated statement of operations, in the current period, along with the offsetting foreign currency gain or loss on the underlying assets or liabilities.

Our use of derivative instruments exposes us to credit risk to the extent that the counterparties may be unable to meet the terms of the agreement. We do, however, seek to mitigate such risks by limiting our counterparties to major financial institutions which are selected based on their credit ratings and other factors. We have established policies and procedures for mitigating credit risk that include establishing counterparty credit limits, monitoring credit exposures, and continually assessing the creditworthiness of counterparties.

There were 201 and 60 foreign exchange forward contracts, designated as “cash flow hedges” and “not designated as hedging instruments”, respectively, open as of October 31, 2019. The aggregated notional amounts by currency and designation as of October 31, 2019 were as follows:

Currency	Derivatives in Cash Flow Hedging Relationships	Derivatives Not Designated as Hedging Instruments
	Forward Contracts	Forward Contracts
	Buy/(Sell)	Buy/(Sell)
	(in millions)	
Euro	\$ 11	\$ 28
British Pound	—	(62)
Singapore Dollar	16	2
Malaysian Ringgit	87	8
Japanese Yen	(86)	(32)
Other currencies	(21)	8
	<u>\$ 7</u>	<u>\$(48)</u>

Derivative instruments are subject to master netting arrangements and are disclosed gross in the consolidated balance sheet. The gross fair values and balance sheet presentation of derivative instruments held as of October 31, 2019 and 2018 were as follows:

Fair Values of Derivative Instruments					
Asset Derivatives			Liability Derivatives		
Balance Sheet Location	Fair Value		Balance Sheet Location	Fair Value	
	October 31, 2019	October 31, 2018		October 31, 2019	October 31, 2018
	(in millions)				
Derivatives designated as hedging instruments:					
Cash flow hedges					
Foreign exchange contracts					
Other current assets	\$1	\$5	Other accrued liabilities	\$2	\$4
Derivatives not designated as hedging instruments:					
Foreign exchange contracts					
Other current assets	<u>1</u>	<u>1</u>	Other accrued liabilities	<u>4</u>	<u>2</u>
Total derivatives	<u>\$2</u>	<u>\$6</u>		<u>\$6</u>	<u>\$6</u>

The effect of derivative instruments for foreign exchange contracts designated as hedging instruments and not designated as hedging instruments in our consolidated statement of operations was as follows:

	<u>2019</u>	<u>2018</u>	<u>2017</u>
	(in millions)		
Derivatives designated as hedging instruments:			
<i>Cash flow hedges</i>			
Foreign exchange contracts:			
Gain (loss) recognized in accumulated other comprehensive income	\$(5)	\$—	\$ 6
Gain (loss) reclassified from accumulated other comprehensive income into earnings:			
Cost of products	(1)	4	(1)
Selling, general and administrative	(2)	—	—
Gain (loss) excluded from effectiveness testing recognized in earnings based on changes in fair value:			
Cost of products	3	—	—
Derivatives not designated as hedging instruments:			
Gain (loss) recognized in other income (expense), net	\$(5)	\$ 4	\$ 6

The estimated amount at October 31, 2019 expected to be reclassified from accumulated other comprehensive income to earnings within the next twelve months is a loss of \$2 million.

15. RETIREMENT PLANS AND POST-RETIREMENT BENEFIT PLANS

General. The majority of our employees are covered under various defined benefit and/or defined contribution retirement plans. Additionally, we sponsor post-retirement health care benefits for our eligible U.S. employees. We provide U.S. employees, who meet eligibility criteria under the Keysight Technologies, Inc. Retirement Plan (“RP”), defined benefits which are based on an employee’s base or target pay during the years of employment and on length of service. For eligible employees’ service through October 31, 1993, the benefit payable under the RP is reduced by any amounts due to the eligible employees’ service under our defined contribution Deferred Profit-Sharing Plan (“DPSP”), which was closed to new participants as of November 1993. Employees hired on or after August 1, 2015 are not eligible to participate in the RP or the Keysight Technologies, Inc. Health Plan for Retirees (“U.S. Post-Retirement Benefit Plan”).

In addition, in the U.S. we maintain the Supplemental Benefits Retirement Plan (“SBRP”), a supplemental unfunded non-qualified defined benefit plan to provide benefits that would be provided under the RP but for limitations imposed by the Internal Revenue Code. The RP and the SBRP comprise the “U.S. Plans.”

As of October 31, 2019, the fair value of plan assets of the DPSP for U.S. employees was \$266 million. The obligation for the DPSP eligible employees equals the fair value of the DPSP assets due to the benefit payable under the RP being the greater of the RP and DPSP.

Eligible employees outside the U.S. generally receive retirement benefits under various retirement plans (“Non-U.S. Plans”) based on factors such as years of service and/or employee compensation levels. Eligibility is generally determined in accordance with local statutory requirements.

401(k) defined contribution plan. Eligible U.S. employees may participate in the Keysight Technologies, Inc. 401(k) Plan (the “401(k) Plan”). Enrollment in the 401(k) Plan is automatic for employees who meet eligibility requirements unless they decline participation. We provide matching contributions to these employees, and the 401(k) Plan employer expense included in income from operations was \$25 million in 2019, \$23 million in 2018 and \$16 million in 2017.

Post-retirement medical benefit plans. In addition to receiving retirement benefits, U.S. employees who meet eligibility requirements as of their termination date may participate in the U.S. Post-Retirement Benefit Plan.

Components of net periodic benefit cost. The company uses alternate methods of amortization, as allowed by the authoritative guidance, which amortizes the actuarial gains and losses on a consistent basis for the years presented. For the U.S. Plans, gains and losses are amortized over the average future working lifetime. For most Non-U.S. Plans and the U.S. Post-Retirement Benefit Plan, gains and losses are amortized using a separate layer for each year’s gains and losses.

On January 1, 2019, we transferred a portion of the assets and liabilities of our Switzerland defined benefit plan to an insurance company, resulting in the recognition of a settlement loss of \$2 million, which is included in other income (expense) in the consolidated statement of operations.

On December 15, 2016, we transferred a portion of the assets and obligations of our Japanese Employees’ Pension Fund (“EPF”) to the Japanese government. The remaining portion of the EPF was transferred to a new Keysight Japan corporate defined benefit pension plan. The difference between the obligations settled with the government of \$142 million and the assets transferred to the government of \$51 million resulted in an increase in the funded status of the new defined benefit pension plan of \$91 million. The settlement resulted in a gain of \$68 million which is included in other operating expense (income) in the consolidated statement of operations for 2017.

For the years ended October 31, 2019, 2018 and 2017, components of net periodic benefit cost (benefit) and other amounts recognized in other comprehensive income were comprised of:

	Defined Benefit Plans						U.S. Post-Retirement Benefit Plan		
	U.S. Plans			Non-U.S. Plans					
	2019	2018	2017	2019	2018	2017	2019	2018	2017
	(in millions)								
Net periodic benefit cost (benefit)									
Service cost — benefits earned during the period	\$ 20	\$ 24	\$ 22	\$ 14	\$ 14	\$ 18	\$ 1	\$ 1	\$ 1
Interest cost on benefit obligation	28	25	21	23	23	23	8	7	7
Expected return on plan assets	(41)	(37)	(33)	(77)	(85)	(74)	(13)	(13)	(11)
Amortization:									
Net actuarial loss	10	12	15	27	25	33	9	16	21
Prior service credit	(4)	(7)	(8)	(1)	(1)	(1)	(14)	(14)	(15)
Net periodic benefit cost (benefit)	13	17	17	(14)	(24)	(1)	(9)	(3)	3
Curtailments and settlements	—	—	—	2	1	(69)	—	—	—
Net periodic benefit cost (benefit)	<u>\$ 13</u>	<u>\$ 17</u>	<u>\$ 17</u>	<u>\$(12)</u>	<u>\$(23)</u>	<u>\$ (70)</u>	<u>\$ (9)</u>	<u>\$ (3)</u>	<u>\$ 3</u>
Other changes in plan assets and benefit obligations recognized in other comprehensive (income) loss									
Net actuarial loss (gain)	\$ 77	\$(11)	\$ 4	\$ 78	\$ 41	\$(145)	\$ 11	\$ (1)	\$(16)
Amortization:									
Net actuarial loss	(10)	(12)	(15)	(27)	(25)	(33)	(9)	(16)	(21)
Prior service credit	4	7	8	1	1	1	14	14	15

	Defined Benefit Plans						U.S. Post-Retirement Benefit Plan		
	U.S. Plans			Non-U.S. Plans					
	2019	2018	2017	2019	2018	2017	2019	2018	2017
	(in millions)								
Settlement	—	—	—	(2)	(1)	(24)	—	—	—
Curtailment	—	—	—	—	—	1	—	—	—
Foreign currency	—	—	—	(1)	(5)	1	—	—	—
Total recognized in other comprehensive (income) loss ..	<u>\$71</u>	<u>\$ (16)</u>	<u>\$ (3)</u>	<u>\$49</u>	<u>\$ 11</u>	<u>\$ (199)</u>	<u>\$16</u>	<u>\$ (3)</u>	<u>\$ (22)</u>
Total recognized in net periodic benefit cost (benefit) and other comprehensive (income) loss	<u>\$84</u>	<u>\$ 1</u>	<u>\$14</u>	<u>\$37</u>	<u>\$ (12)</u>	<u>\$ (269)</u>	<u>\$ 7</u>	<u>\$ (6)</u>	<u>\$ (19)</u>

We record the service cost component of net periodic benefit cost (benefit) in the same line item as other employee compensation costs. We record the non-service components of net periodic benefit cost (benefit), such as interest cost, expected return on assets, amortization of prior service cost, and actuarial gains or losses, within other income (expense) in the consolidated statement of operations.

Funded status. As of October 31, 2019 and 2018, the funded status of the defined benefit and post-retirement benefit plans was as follows:

	U.S. Defined Benefit Plans		Non-U.S. Defined Benefit Plans		U.S. Post-Retirement Benefit Plan	
	2019	2018	2019	2018	2019	2018
	(in millions)					
Change in fair value of plan assets:						
Fair value — beginning of year	\$ 575	\$515	\$1,392	\$1,440	\$172	\$182
Actual return on plan assets	64	6	167	2	18	3
Employer contributions	—	85	26	33	—	—
Settlements	—	—	(25)	(6)	—	—
Benefits paid	(24)	(31)	(43)	(42)	(14)	(13)
Other	—	—	(4)	—	—	—
Currency impact	—	—	25	(35)	—	—
Fair value — end of year	<u>\$ 615</u>	<u>\$575</u>	<u>\$1,538</u>	<u>\$1,392</u>	<u>\$176</u>	<u>\$172</u>
Change in benefit obligation:						
Benefit obligation — beginning of year	\$ 650	\$675	\$1,249	\$1,338	\$190	\$207
Service cost	20	24	14	14	1	1
Interest cost	28	25	23	23	8	7
Settlements	—	—	(25)	(6)	—	—
Curtailments	—	—	—	—	—	—
Actuarial loss (gain)	101	(43)	169	(43)	17	(12)
Benefits paid	(25)	(31)	(43)	(42)	(14)	(13)
Other	—	—	(8)	—	—	—
Currency impact	—	—	14	(35)	—	—
Benefit obligation — end of year	<u>\$ 774</u>	<u>\$650</u>	<u>\$1,393</u>	<u>\$1,249</u>	<u>\$202</u>	<u>\$190</u>
Overfunded (Underfunded) status of PBO	<u>\$ (159)</u>	<u>\$ (75)</u>	<u>\$ 145</u>	<u>\$ 143</u>	<u>\$ (26)</u>	<u>\$ (18)</u>
Amounts recognized in the consolidated balance sheet consist of:						
Other assets	\$ —	\$ —	\$ 297	\$ 257	\$ —	\$ —
Employee compensation and benefits	(1)	(1)	—	—	—	—
Retirement and post-retirement benefits	<u>(158)</u>	<u>(74)</u>	<u>(152)</u>	<u>(114)</u>	<u>(26)</u>	<u>(18)</u>
Net asset (liability) ^(a)	<u>\$ (159)</u>	<u>\$ (75)</u>	<u>\$ 145</u>	<u>\$ 143</u>	<u>\$ (26)</u>	<u>\$ (18)</u>

	U.S. Defined Benefit Plans		Non-U.S. Defined Benefit Plans		U.S. Post- Retirement Benefit Plan	
	2019	2018	2019	2018	2019	2018
	(in millions)					
Amounts recognized in accumulated other comprehensive income (loss):						
Actuarial losses	\$179	\$112	\$444	\$396	\$ 29	\$ 28
Prior service credits	—	(4)	—	(1)	(13)	(28)
Total	<u>\$179</u>	<u>\$108</u>	<u>\$444</u>	<u>\$395</u>	<u>\$ 16</u>	<u>\$ —</u>

(a) Certain of our immaterial defined benefit plans are not included in these disclosures.

The amounts in accumulated other comprehensive income expected to be amortized into net periodic benefit cost (benefit) during 2020 are as follows:

	U.S. Defined Benefit Plans	Non-U.S. Defined Benefit Plans	U.S. Post- Retirement Benefit Plan
		(in millions)	
Amortization of net prior service credit	\$—	\$—	\$(11)
Amortization of actuarial net loss	\$19	\$34	\$ 10

Investment policies and strategies as of October 31, 2019. In the U.S., our RP and U.S. Post-Retirement Benefit Plan target asset allocations are approximately 70 percent to equities and approximately 30 percent to fixed income investments. Our DPSP target asset allocation is approximately 60 percent to equities and approximately 40 percent to fixed income investments. The general investment objective for all our plan assets is to obtain the optimum rate of investment return on the total investment portfolio consistent with the assumption of a reasonable level of risk. Specific investment objectives for the plans' portfolios are to: maintain and enhance the purchasing power of the plans' assets; achieve investment returns consistent with the level of risk being taken; and earn performance rates of return in accordance with the benchmarks adopted for each asset class. Outside of the U.S., our target asset allocation is from 10 to 60 percent to equities, from 40 to 90 percent to fixed income investments, and from zero to 11 percent to cash and other, depending on the plan. All plans' assets are broadly diversified. Due to fluctuations in capital markets, our actual allocations of plan assets as of October 31, 2019, differ from the target allocation. Our policy is to periodically bring the actual allocation in line with the target allocation.

Equity securities include exchange-traded common stock and preferred stock of companies from broadly diversified industries. Fixed income securities include a portfolio of corporate bonds of companies from diversified industries, government securities, mortgage-backed securities, asset-backed securities, derivative instruments and other. Portions of the cash and cash equivalent, equity, and fixed income investments are held in commingled funds. Investments in commingled funds are valued using the net asset value ("NAV") method as a practical expedient. Investments valued using the NAV method are allocated across a broad array of funds and diversify the portfolio. The value of the plan assets directly affects the funded status of our pension and post-retirement benefit plans recorded in the financial statements.

Fair Value. The measurement of the fair value of pension and post-retirement plan assets uses the valuation methodologies and the inputs as described in Note 13, "Fair Value Measurements."

Cash and Cash Equivalents - Cash and cash equivalents consist of short-term investment funds that are invested in short-term domestic fixed income securities and other securities with debt-like characteristics, emphasizing short-term maturities and quality. Cash and cash equivalents are generally classified as Level 2 investments except when the cash and cash equivalents are held in commingled funds, which have a daily NAV derived from quoted prices for the underlying securities in active markets; these are classified as assets measured at NAV.

Equity - Some equity securities consisting of common and preferred stock are held in commingled funds, which have daily NAVs derived from quoted prices for the underlying securities in active markets; these are classified as assets measured at NAV. Commingled funds which have quoted prices in active markets are classified as Level 1 investments.

Fixed Income - Some of the fixed income securities are held in commingled funds, which have daily NAVs derived from the underlying securities; these are classified as assets measured at NAV. Commingled funds which have quoted prices in active markets are classified as Level 1 investments.

Other Investments - Other investments include property-based pooled vehicles which invest in real estate. Market NAVs are regularly published in the financial press or on corporate websites; therefore, these investments are classified as Level 3 investments or assets measured at NAV.

The following tables present the fair value of U.S. Defined Benefit Plans assets classified under the appropriate level of the fair value hierarchy as of October 31, 2019 and 2018:

Fair Value Measurement as of October 31, 2019 Using					
	October 31, 2019	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2) (in millions)	Significant Unobservable Inputs (Level 3)	Assets Measured at NAV ^(b)
Cash and cash equivalents.....	\$ 14	\$ —	\$ 14	\$—	\$ —
Equity.....	428	130	1	—	297
Fixed income.....	173	14	101	—	58
Other investments.....	—	—	—	—	—
Total assets measured at fair value.....	<u>\$615</u>	<u>\$144</u>	<u>\$116</u>	<u>\$—</u>	<u>\$355</u>

(b) Certain instruments that are measured at fair value using the NAV per share practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total value of plan assets.

Fair Value Measurement as of October 31, 2018 Using					
	October 31, 2018	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2) (in millions)	Significant Unobservable Inputs (Level 3)	Assets Measured at NAV ^(b)
Cash and cash equivalents.....	\$ 4	\$ —	\$ 4	\$—	\$ —
Equity.....	392	120	1	—	271
Fixed income.....	179	14	94	—	71
Other investments.....	—	—	—	—	—
Total assets measured at fair value.....	<u>\$575</u>	<u>\$134</u>	<u>\$99</u>	<u>\$—</u>	<u>\$342</u>

(b) Certain instruments that are measured at fair value using the NAV per share practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total value of plan assets.

For U.S. Defined Benefit Plans, there was no activity relating to assets measured at fair value using significant unobservable inputs (Level 3) during 2019 and 2018.

The following tables present the fair value of U.S. Post-Retirement Benefit Plan assets classified under the appropriate level of the fair value hierarchy as of October 31, 2019 and 2018:

Fair Value Measurement as of October 31, 2019 Using					
	October 31, 2019	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Assets Measured at NAV ^(b)
			(in millions)		
Cash and cash equivalents.....	\$ 5	\$—	\$ 5	\$—	\$ —
Equity.....	121	37	—	—	84
Fixed income.....	50	4	29	—	17
Other investments.....	—	—	—	—	—
Total assets measured at fair value.....	<u>\$176</u>	<u>\$41</u>	<u>\$34</u>	<u>\$—</u>	<u>\$101</u>

(b) Certain instruments that are measured at fair value using the NAV per share practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total value of plan assets.

Fair Value Measurement as of October 31, 2018 Using					
	October 31, 2018	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Assets Measured at NAV ^(b)
			(in millions)		
Cash and cash equivalents.....	\$ 1	\$—	\$ 1	\$—	\$ —
Equity.....	120	37	—	—	83
Fixed income.....	51	4	27	—	20
Other investments.....	—	—	—	—	—
Total assets measured at fair value.....	<u>\$172</u>	<u>\$41</u>	<u>\$28</u>	<u>\$—</u>	<u>\$103</u>

(b) Certain instruments that are measured at fair value using the NAV per share practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total value of plan assets.

For U.S. Post-Retirement Benefit Plan, there was no activity relating to assets measured at fair value using significant unobservable inputs (Level 3) during 2019 and 2018.

The following tables present the fair value of Non-U.S. Defined Benefit Plans assets classified under the appropriate level of the fair value hierarchy as of October 31, 2019 and 2018:

Fair Value Measurement as of October 31, 2019 Using					
	October 31, 2019	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2) (in millions)	Significant Unobservable Inputs (Level 3)	Assets Measured at NAV ^(b)
Cash and cash equivalents.....	\$ —	\$ —	\$ —	\$—	\$ —
Equity.....	659	153	—	—	506
Fixed income.....	879	—	202	—	677
Other investments.....	—	—	—	—	—
Total assets measured at fair value.....	<u>\$1,538</u>	<u>\$153</u>	<u>\$202</u>	<u>\$—</u>	<u>\$1,183</u>

(b) Certain instruments that are measured at fair value using the NAV per share practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total value of plan assets.

Fair Value Measurement as of October 31, 2018 Using					
	October 31, 2018	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2) (in millions)	Significant Unobservable Inputs (Level 3)	Assets Measured at NAV ^(b)
Cash and cash equivalents.....	\$ —	\$ —	\$ —	\$—	\$ —
Equity.....	791	135	—	—	656
Fixed income.....	595	—	208	—	387
Other investments.....	6	—	—	3	3
Total assets measured at fair value.....	<u>\$1,392</u>	<u>\$135</u>	<u>\$208</u>	<u>\$ 3</u>	<u>\$1,046</u>

(b) Certain instruments that are measured at fair value using the NAV per share practical expedient have not been categorized in the fair value hierarchy. The fair value amounts presented in this table are intended to permit reconciliation of the fair value hierarchy to the total value of plan assets.

For Non-U.S. Defined Benefit Plans assets measured at fair value using significant unobservable inputs (Level 3), the following table summarizes the change in balances during 2019 and 2018:

	Year Ended October 31,	
	2019	2018
	(in millions)	
Balance, beginning of year	\$ 3	\$ 3
Realized gains	—	—
Unrealized gains/(losses)	—	—
Purchases, sales, issuances, and settlements	(3)	—
Transfers in (out)	—	—
Balance, end of year	<u>\$—</u>	<u>\$ 3</u>

The table below presents the combined projected benefit obligation (“PBO”), accumulated benefit obligation (“ABO”) and fair value of plan assets, grouping plans using comparisons of the PBO and ABO relative to the plan assets as of October 31, 2019 and 2018:

	2019		2018	
	Benefit Obligation PBO	Fair Value of Plan Assets	Benefit Obligation PBO	Fair Value of Plan Assets
	(in millions)		(in millions)	
U.S. defined benefit plans where PBO exceeds the fair value of plan assets . . .	\$ 774	\$ 615	\$ 650	\$ 575
U.S. defined benefit plans where fair value of plan assets exceeds PBO	—	—	—	—
Total	<u>\$ 774</u>	<u>\$ 615</u>	<u>\$ 650</u>	<u>\$ 575</u>
Non-U.S. defined benefit plans where PBO exceeds the fair value of plan assets	\$ 396	\$ 244	\$ 363	\$ 249
Non-U.S. defined benefit plans where fair value of plan assets exceeds PBO . .	997	1,294	886	1,143
Total	<u>\$1,393</u>	<u>\$1,538</u>	<u>\$1,249</u>	<u>\$1,392</u>
	ABO		ABO	
U.S. defined benefit plans where ABO exceeds the fair value of plan assets . . .	\$ 720	\$ 615	\$ 609	\$ 575
U.S. defined benefit plans where the fair value of plan assets exceeds ABO . . .	—	—	—	—
Total	<u>\$ 720</u>	<u>\$ 615</u>	<u>\$ 609</u>	<u>\$ 575</u>
Non-U.S. defined benefit plans where ABO exceeds the fair value of plan assets	\$ 383	\$ 244	\$ 351	\$ 249
Non-U.S. defined benefit plans where fair value of plan assets exceeds ABO . .	991	1,294	879	1,143
Total	<u>\$1,374</u>	<u>\$1,538</u>	<u>\$1,230</u>	<u>\$1,392</u>

Contributions and estimated future benefit payments. In 2018 we made an accelerated contribution of \$85 million to our U.S. Defined Benefit Plans to secure tax deductibility prior to new tax legislation taking effect. During 2020, we do not expect to contribute to the U.S. Defined Benefit Plans or the U.S. Post-Retirement Benefit Plan, and we expect to contribute \$11 million to the Non-U.S. Defined Benefit Plans. The following table presents expected future benefit payments for the next 10 years.

	U.S. Defined Benefit Plans	Non-U.S. Defined Benefit Plans	U.S. Post- Retirement Benefit Plan
	(in millions)		
2020	\$ 51	\$ 31	\$17
2021	\$ 50	\$ 34	\$18
2022	\$ 54	\$ 36	\$17
2023	\$ 56	\$ 39	\$16
2024	\$ 57	\$ 42	\$15
2025 - 2029	\$286	\$222	\$72

Assumptions. The assumptions used to determine the benefit obligations and expense for our defined benefit and post-retirement benefit plans are presented in the tables below. The expected long-term return on assets below represents an estimate of long-term returns on investment portfolios, consisting of a mixture of equities, fixed income and other investments, in proportion to the asset allocations of each of our plans. We consider long-term rates of return, which are weighted based on the asset classes (both historical and forecasted) in which we expect our pension and post-retirement funds to be invested. Discount rates reflect the current rate at which pension and post-retirement obligations could be settled based on the measurement dates of the plans, which is October 31. The U.S. discount rates as of October 31, 2019 and 2018 were determined based on the results of matching expected plan benefit payments with cash flows from a hypothetically constructed bond portfolio. The Non-U.S. discount rates as of October 31, 2019 and 2018 were determined using spot rates along the yield curve to calculate disaggregated discount rates. In addition, we used this method to calculate two components of the periodic benefit cost: service cost and interest cost. The range of assumptions that were used for the Non-U.S. Defined Benefit Plans reflects the different economic environments within various countries.

Assumptions used to calculate the net periodic benefit cost (benefit) were as follows:

	<u>Year ended October 31,</u>	
	<u>2019</u>	<u>2018</u>
U.S. Defined Benefit Plans:		
Discount rate	4.50%	3.75%
Average increase in compensation levels	3.00%	3.00%
Expected long-term return on assets	7.50%	7.50%
Non-U.S. Defined Benefit Plans:		
Discount rate	0.54-2.83%	0.59-2.52%
Average increase in compensation levels	2.50-3.00%	2.50-3.25%
Expected long-term return on assets	4.00-6.50%	4.00-6.50%
U.S. Post-Retirement Benefits Plan:		
Discount rate	4.25%	3.50%
Expected long-term return on assets	7.50%	7.50%
Current medical cost trend rate	6.00%	6.00%
Ultimate medical cost trend rate	4.00%	3.50%
Medical cost trend rate decreases to ultimate rate in year	2029	2029

Assumptions used to calculate the benefit obligation as of October 31, 2019 and 2018 were as follows:

	<u>Year ended October 31,</u>	
	<u>2019</u>	<u>2018</u>
U.S. Defined Benefit Plans:		
Discount rate	3.25%	4.50%
Average increase in compensation levels	3.00%	3.00%
Non-U.S. Defined Benefit Plans:		
Discount rate	0.79-1.89%	0.83-2.83%
Average increase in compensation levels	2.50-3.00%	2.50-3.00%
U.S. Post-Retirement Benefits Plan:		
Discount rate	3.00%	4.25%
Current medical cost trend rate	6.25%	6.00%
Ultimate medical cost trend rate	4.50%	4.00%
Medical cost trend rate decreases to ultimate rate in year	2027	2029

Health care trend rates did not have a significant effect on the total service and interest cost components or on the post-retirement benefit obligation amounts reported for the U.S. Post-Retirement Benefit Plan for the years ended October 31, 2019 and 2018.

16. GUARANTEES

Standard Warranty

Keysight warranties on products sold through direct sales channels are primarily for one year. Warranties for products sold through distribution channels are primarily for three years. We accrue for standard warranty costs based on historical trends in warranty charges. The accrual is reviewed regularly and periodically adjusted to reflect changes in warranty cost estimates. Estimated warranty charges are recorded within cost of products at the time related product revenue is recognized.

Activity related to the standard warranty accrual, which is included in other accrued and other long-term liabilities in our consolidated balance sheet, is as follows:

	<u>Year Ended October 31,</u>	
	<u>2019</u>	<u>2018</u>
	<u>(in millions)</u>	
Beginning balance	\$ 45	\$ 45
Accruals for warranties, including change in estimates	28	36
Settlements made during the period	<u>(35)</u>	<u>(36)</u>
Ending balance	<u>\$ 38</u>	<u>\$ 45</u>
Accruals for warranties due within one year	\$ 23	\$ 25
Accruals for warranties due after one year	<u>15</u>	<u>20</u>
Ending balance	<u>\$ 38</u>	<u>\$ 45</u>

Indemnification Obligations Related to Transactions

In connection with acquisitions, divestitures, mergers, spin-offs and other transactions, we have agreed to indemnify certain parties for damages, losses, expenses and liabilities arising in the future but which were incurred prior to or are related to such transactions. The liabilities covered by these indemnifications include but are not limited to tax, employment, benefits, intellectual property, environmental, and other liabilities. In our opinion, the fair value of these indemnification obligations is not material as of October 31, 2019.

Indemnifications to Officers and Directors

Our corporate by-laws require that we indemnify our officers and directors, as well as those who act as directors and officers of other entities at our request, against expenses, judgments, fines, settlements and other amounts actually and reasonably incurred in connection with any proceedings arising out of their services to Keysight and such other entities, including service with respect to employee benefit plans. In addition, we have entered into separate indemnification agreements with each director and each board-appointed officer of Keysight which provide for indemnification under similar and additional circumstances. The indemnification obligations are more fully described in the by-laws and the indemnification agreements. We purchase standard insurance to cover claims or a portion of the claims made against our directors and officers. Since a maximum obligation is not explicitly stated in our by-laws or in our indemnification agreements and will depend on the facts and circumstances that arise out of any future claims, the overall maximum amount of the obligations cannot be reasonably estimated. Historically, we have not made payments related to these obligations, and the fair value for these indemnification obligations was not material as of October 31, 2019.

Other Indemnifications

As is customary in our industry and as provided for in local law in the U.S. and other jurisdictions, many of our standard contracts provide remedies to our customers and others with whom we enter into contracts, such as defense, settlement, or payment of judgment for intellectual property claims related to the use of our products. From time to time, we indemnify customers, as well as our suppliers, contractors, lessors, lessees, companies that purchase our businesses or assets and others with whom we enter into contracts, against combinations of loss, expense, or liability arising from various triggering events related to the sale and the use of our products and services, the use of their goods and services, the use of facilities and state of our owned facilities, the state of the assets and businesses that we sell and other matters covered by such contracts, usually up to a specified maximum amount. In addition, from

time to time we also provide protection to these parties against claims related to undiscovered liabilities, additional product liability or environmental obligations. In our experience, claims made under such indemnifications are rare and the associated estimated fair value of such liabilities was not material as of October 31, 2019.

17. COMMITMENTS AND CONTINGENCIES

Operating Lease Commitments. We lease certain real and personal property from unrelated third parties under non-cancellable operating leases. Future minimum lease payments under operating leases as of October 31, 2019 were \$48 million in 2020, \$40 million in 2021, \$31 million in 2022, \$19 million in 2023, \$12 million in 2024 and \$46 million thereafter. Certain leases require us to pay property taxes, insurance and routine maintenance, and include escalation clauses. Total rent expense was \$70 million in 2019, \$60 million in 2018 and \$51 million in 2017.

Capital Lease Commitments. We had capital lease obligations of \$4 million as of October 31, 2019 and \$4 million as of October 31, 2018. The current portion of the total obligation is included in other accrued liabilities and the remaining long-term portion is included in other long-term liabilities on the consolidated balance sheet. Assets held under capital leases are included in net property, plant, and equipment on the consolidated balance sheet.

Litigation and Contingencies. We are involved in lawsuits, claims, investigations and proceedings, including, but not limited to, patent, commercial and environmental matters, which arise in the ordinary course of business. There are no matters pending that we currently believe are reasonably possible of having a material impact to our business, consolidated financial condition, results of operations or cash flows.

18. DEBT

The following table summarizes the components of our long-term debt:

	October 31,	
	2019	2018
	(in millions)	
2024 Senior Notes at 4.55% (\$600 face amount less unamortized costs of \$3 and \$3)	\$ 597	\$ 597
2027 Senior Notes at 4.60% (\$700 face amount less unamortized costs of \$5 and \$6)	695	694
2029 Senior Notes at 3.00% (\$500 face amount less unamortized costs of \$4)	496	—
	<u>\$1,788</u>	<u>\$1,291</u>

Short-Term Debt

Revolving Credit Facility

On February 15, 2017, we entered into an amended and restated credit agreement (the “Revolving Credit Facility”) that replaced our existing \$450 million unsecured credit facility dated September 15, 2014. The Revolving Credit Facility provides for a \$450 million, five-year unsecured revolving credit facility that will expire on February 15, 2022 and bears interest at an annual rate of LIBOR + 1.10%. In addition, the Revolving Credit Facility permits us to increase the total commitments under this credit facility by up to \$150 million in the aggregate on one or more occasions upon request. We may use amounts borrowed under the facility for general corporate purposes. As of October 31, 2019, we had no borrowings outstanding under the Revolving Credit Facility. We were in compliance with the covenants of the Revolving Credit Facility during the year ended October 31, 2019.

2019 Senior Notes

In October 2014, the company issued an aggregate principal amount of \$500 million in unsecured senior notes (“2019 Senior Notes”). These notes matured on October 30, 2019 and were fully repaid.

Long-Term Debt

The below senior notes are unsecured and rank equally in right of payment with all of our other senior unsecured indebtedness.

2024 Senior Notes

In October 2014, the company issued an aggregate principal amount of \$600 million in unsecured senior notes (“2024 Senior Notes”). The 2024 Senior Notes were issued at 99.966 percent of their principal amount. The notes

will mature on October 30, 2024, and bear interest at a fixed rate of 4.55 percent per annum. The interest is payable semi-annually on April 30 and October 30 of each year. We incurred issuance costs of \$5 million in connection with the 2024 Senior Notes that are being amortized to interest expense over the term of the senior notes.

2027 Senior Notes

In April 2017, the company issued an aggregate principal amount of \$700 million in unsecured senior notes (“2027 Senior Notes”). The 2027 Senior Notes were issued at 99.873 percent of their principal amount. The notes will mature on April 6, 2027 and bear interest at a fixed rate of 4.60 percent per annum. The interest is payable semi-annually on April 6 and October 6 of each year, commencing on October 6, 2017. We incurred issuance costs of \$6 million in connection with the 2027 Senior Notes that, along with the debt discount, are being amortized to interest expense over the term of the senior notes.

2029 Senior Notes

In October 2019, the company issued an aggregate principal amount of \$500 million in unsecured senior notes (“2029 Senior Notes”). The 2029 Senior Notes were issued at 99.914 percent of their principal amount. The notes will mature on October 30, 2029 and bear interest at a fixed rate of 3.00 percent per annum. The interest is payable semi-annually on April 30 and October 30 of each year, commencing on April 30, 2020. We incurred issuance costs of \$4 million in connection with the 2029 Senior Notes that, along with the debt discount are being amortized to interest expense over the term of the senior notes.

Senior Unsecured Term Loan

On February 15, 2017, we entered into a term credit agreement that provided for a three-year \$400 million senior unsecured term loan that bore interest at an annual rate of LIBOR + 1.50%. The term loan was drawn upon the closing of the Ixia acquisition. On February 27, 2018, we fully repaid the borrowings outstanding under the term loan of \$260 million and terminated the credit agreement. We had previously repaid \$140 million of the term loan during the year ended October 31, 2017.

Letters of Credit

As of October 31, 2019 and October 31, 2018, we had \$37 million and \$31 million, respectively, of outstanding letters of credit and surety bonds unrelated to the credit facility that were issued by various lenders.

19. STOCKHOLDERS’ EQUITY

Stock Repurchase Program

On May 29, 2019, the Board of Directors approved a new stock repurchase program authorizing the purchase of up to \$500 million of the company’s common stock, replacing a previously approved 2018 program authorizing the purchase of up to \$350 million of the company’s common stock, of which \$160 million remained. Under the new program, shares may be purchased from time to time, subject to general business and market conditions and other investment opportunities, through open market purchases, privately negotiated transactions or other means. All such shares and related costs are held as treasury stock and accounted for at trade date using the cost method. The stock repurchase program may be commenced, suspended or discontinued at any time at the company’s discretion and does not have an expiration date.

In 2019 we repurchased 2,093,570 shares of common stock for \$160 million. In 2018 we repurchased 2,075,460 shares of common stock for \$120 million. In 2017 we did not repurchase any shares of common stock under the stock repurchase program. All such shares and related costs are held as treasury stock and accounted for at trade date using the cost method.

Accumulated other comprehensive loss

The following table summarizes the components of our accumulated other comprehensive loss as of October 31, 2019 and 2018, net of tax effect:

	October 31,	
	2019	2018
	(in millions)	
Unrealized gain on equity securities, net of tax (expense) of zero and \$(2)	\$ —	\$ —
Foreign currency translation, net of tax (expense) of \$(63) and \$(63)	(43)	(60)
Unrealized losses on defined benefit plans, net of tax benefit of \$113 and \$81	(532)	(426)
Unrealized losses on derivative instruments, net of tax (expense) of zero and \$(1)	(3)	(2)
Total accumulated other comprehensive loss	<u>\$(578)</u>	<u>\$(488)</u>

Changes in accumulated other comprehensive income (loss) by component and related tax effects for the years ended October 31, 2019 and 2018 were as follows:

			Net defined benefit pension cost and post retirement plan costs:			
	Unrealized gain (loss) on equity securities	Foreign currency translation	Actuarial Losses	Prior service credits	Unrealized gains (losses) on derivatives	Total
			(in millions)			
At October 31, 2017.....	\$ 14	\$(39)	\$(468)	\$ 35	\$ 1	\$(457)
Other comprehensive income (loss) before reclassifications	(17)	(21)	(23)	—	—	(61)
Amounts reclassified out of accumulated other comprehensive income (loss)	—	—	53	(22)	(4)	27
Tax (expense) benefit.....	3	—	(7)	6	1	3
Other comprehensive income (loss) for the twelve months ended October 31, 2018.....	(14)	(21)	23	(16)	(3)	(31)
At October 31, 2018.....	—	(60)	(445)	19	(2)	(488)
Other comprehensive income (loss) before reclassifications	—	17	(168)	—	(5)	(156)
Amounts reclassified out of accumulated other comprehensive income (loss)	—	—	49	(19)	3	33
Tax (expense) benefit.....	—	—	28	4	1	33
Other comprehensive income (loss) for the twelve months ended October 31, 2019.....	—	17	(91)	(15)	(1)	(90)
At October 31, 2019.....	\$ —	\$(43)	\$(536)	\$ 4	\$(3)	\$(578)

Reclassifications out of accumulated other comprehensive loss for the years ended October 31, 2019 and 2018 were as follows:

Details about accumulated other comprehensive loss components	Amounts reclassified from other comprehensive loss		Affected line item in statement of operations
	Year Ended October 31,		
	2019	2018	
	(in millions)		
Unrealized gains (losses) on derivatives	\$ (1)	\$ 4	Cost of products
	(2)	—	Selling, general and administrative
	<u>—</u>	<u>(1)</u>	Provision for income tax
	<u>(3)</u>	<u>3</u>	Net of Income Tax
Net defined benefit pension cost and post retirement plan costs:			
Net actuarial losses	(49)	(53)	
Prior service credits	<u>19</u>	<u>22</u>	
	(30)	(31)	Total before income tax
	<u>7</u>	<u>9</u>	Provision for income tax
	<u>(23)</u>	<u>(22)</u>	Net of income tax
Total reclassifications for the period	\$(26)	\$(19)	

An amount in parentheses indicates a reduction to income and an increase to the accumulated other comprehensive income.

Reclassifications of prior service credits and net actuarial losses in respect of retirement plans and post retirement pension plans are included in the computation of net periodic cost (see Note 15, “Retirement Plans and Post Retirement Pension Plans”).

20. SEGMENT INFORMATION

We provide electronic design and test instruments and systems and related software, software design tools, and related services that are used in the design, development, manufacture, installation, deployment and operation of electronics equipment. Related services include start-up assistance, instrument productivity and application services and instrument calibration and repair. Additionally, we provide test, security and visibility solutions that validate, secure and optimize networks and applications from engineering concept to live deployment. We also offer customization, consulting and optimization services throughout the customer’s product life cycle.

In 2019 we completed an organizational change to align our services business with our customer-solutions-oriented, go-to-market strategy as reflected by our Keysight Leadership Model (“KLM”). This change was made to fully reflect our services delivery within the markets served and further enable the growth of our services solutions portfolio. Prior period segment results were revised to conform to the presentation. As a result, Keysight has three segments: Communications Solutions Group, Electronic Industrial Solutions Group and Ixia Solutions Group. The organizational structure continues to include centralized enterprise functions that provide support across the groups.

To more effectively and efficiently address customer solution needs across the communications ecosystem as the network transforms, in the first quarter of fiscal 2020, we completed an organizational change to manage our Ixia Solutions Group within our Communications Solutions Group. We believe this realignment will create improved go-to-market and product development alignment, as well as accelerate solution synergies in 5G as this new technology is deployed globally. As a result, beginning with our first quarter of fiscal 2020, we will have two reportable operating segments, Communications Solutions Group (“CSG”) and Electronic Industrial Solutions Group (“EISG”).

Our operating segments were determined based primarily on how the chief operating decision maker views and evaluates our operations. Segment operating results are regularly reviewed by the chief operating decision maker to

make decisions about resources to be allocated to each segment and to assess performance. Other factors, including market separation and customer specific applications, go-to-market channels, products and services and manufacturing are considered in determining the formation of these operating segments.

Descriptions of our three reportable segments are as follows:

The Communications Solutions Group serves customers spanning the worldwide commercial communications and aerospace, defense and government end markets. The group provides electronic design and test software, instruments, systems and related services used in the simulation, design, validation, manufacturing, installation and optimization of electronic equipment.

The Electronic Industrial Solutions Group provides test and measurement solutions and related services across a broad set of electronic industrial end markets, focusing on high-value applications in the automotive and energy industry and measurement solutions for consumer electronics, education, general electronics design and manufacturing, and semiconductor design and manufacturing. The group provides electronic design and test software, instruments and systems and related services used in the simulation, design, validation, manufacturing, installation and optimization of electronic equipment.

The Ixia Solutions Group helps customers design, validate and optimize the performance and security resilience of their networks and associated components and applications. Network test, network visibility and security solutions help organizations and their customers strengthen their physical and virtual networks. The group's solutions consist of software applications and services, including warranty and maintenance offerings, and high-performance hardware platforms.

A significant portion of the segments' expenses arise from shared services and infrastructure that we have historically provided to the segments in order to realize economies of scale and to efficiently use resources. These expenses, collectively called corporate charges, include legal, accounting, real estate, insurance services, information technology services, treasury and other corporate infrastructure expenses. Charges are allocated to the segments, and the allocations have been determined on a basis that we considered to be a reasonable reflection of the utilization of services provided to or benefits received by the segments.

The following tables reflect the results of our reportable segments under our management reporting system. These results are not necessarily in conformity with GAAP. The performance of each segment is measured based on several metrics, including income from operations. These results are used, in part, by the chief operating decision maker in evaluating the performance of, and in allocating resources to, each of the segments.

The profitability of each of the segments is measured after excluding share-based compensation expense, restructuring and related costs, amortization of acquisition-related balances, acquisition and integration costs, acquisition-related compensation expense, separation and related costs, pension curtailment and settlement loss (gain), northern California wildfire-related costs, goodwill impairment, legal settlement, gain on divestitures, interest income, interest expense and other items as noted in the reconciliations below.

	<u>Communications Solutions Group</u>	<u>Electronic Industrial Solutions Group</u>	<u>Ixia Solutions Group</u>	<u>Total Segments</u>
		(in millions)		
Year ended October 31, 2019:				
Total net revenue.....	\$2,688	\$1,135	\$480	\$4,303
Amortization of acquisition-related balances.....	—	—	9	9
Total segment revenue	\$2,688	\$1,135	\$489	\$4,312
Segment income from operations.....	\$ 714	\$ 294	\$ 29	\$1,037
Depreciation expense	\$ 55	\$ 22	\$ 19	\$ 96
Year ended October 31, 2018:				
Total net revenue.....	\$2,391	\$1,071	\$416	\$3,878
Amortization of acquisition-related balances.....	1	—	35	36
Total segment revenue	\$2,392	\$1,071	\$451	\$3,914
Segment income from operations.....	\$ 474	\$ 245	\$ 16	\$ 735
Depreciation expense	\$ 64	\$ 23	\$ 16	\$ 103

	Communications Solutions Group	Electronic Industrial Solutions Group	Ixia Solutions Group	Total Segments
		(in millions)		
Year ended October 31, 2017:				
Total net revenue.....	\$2,063	\$929	\$197	\$3,189
Amortization of acquisition-related balances.....	<u>1</u>	<u>—</u>	<u>\$ 59</u>	<u>60</u>
Total segment revenue.....	\$2,064	\$929	\$256	\$3,249
Segment income from operations.....	\$ 347	\$209	\$ 42	\$ 598
Depreciation expense.....	\$ 62	\$ 23	\$ 7	\$ 92

The following table reconciles reportable segments' income from operations to our total enterprise income before taxes:

	Year Ended October 31,		
	2019	2018	2017
	(in millions)		
Total reportable segments' income from operations.....	\$1,037	\$ 735	\$ 598
Share-based compensation expense.....	(82)	(59)	(56)
Restructuring and related costs.....	(9)	(17)	(11)
Amortization of acquisition-related balances.....	(224)	(265)	(256)
Acquisition and integration costs.....	(9)	(49)	(57)
Acquisition-related compensation expense.....	—	—	(28)
Separation and related costs.....	—	(2)	(20)
Northern California wildfire-related costs.....	—	(7)	(16)
Goodwill impairment.....	—	(709)	—
Legal settlement.....	—	(25)	—
Gain on divestitures.....	1	20	—
Other.....	<u>(3)</u>	<u>(16)</u>	<u>(6)</u>
Income (loss) from operations, as reported.....	711	(394)	148
Interest income.....	23	12	7
Interest expense.....	(80)	(83)	(80)
Other income (expense), net.....	<u>61</u>	<u>54</u>	<u>104</u>
Income (loss) before taxes, as reported.....	\$ 715	\$ (411)	\$ 179

Major customers. No customer represented 10 percent or more of our total net revenue in 2019, 2018 or 2017.

The following table presents assets and capital expenditures directly managed by each segment. Unallocated assets primarily consist of cash and cash equivalents, prepaid expenses, investments, long-term and other receivables and other assets.

	Communications Solutions Group	Electronic Industrial Solutions Group	Ixia Solutions Group	Total Segments
		(in millions)		
As of and for the year ended October 31, 2019:				
Assets.....	\$2,267	\$928	\$1,404	\$4,599
Capital expenditures.....	\$ 71	\$ 29	\$ 20	\$ 120
As of and for the year ended October 31, 2018:				
Assets.....	\$2,115	\$888	\$1,327	\$4,330
Capital expenditures.....	\$ 90	\$ 32	\$ 10	\$ 132

The following table reconciles segment assets to our total assets:

	October 31,	
	2019	2018
	(in millions)	
Total reportable segments' assets	\$4,599	\$4,330
Cash and cash equivalents	1,598	913
Prepaid expenses	130	106
Other current assets	3	9
Investments	46	46
Long-term and other receivables	94	118
Other	153	302
Total assets	<u>\$6,623</u>	<u>\$5,824</u>

The other category primarily includes pension assets and also represents the difference between how segments report deferred taxes and intangible assets at the initial purchased amount.

The following table presents summarized information for net revenue and long-lived assets by geographic region. Revenues from external customers are generally attributed to countries based upon the location of the Keysight sales representative. Long lived assets consist of property, plant, and equipment, long-term receivables and other long-term assets excluding intangible assets. The rest of the world primarily consists of rest of Asia and Europe.

	United States	China	Japan	Rest of the World	Total
	(in millions)				
Net revenue:					
Year ended October 31, 2019	\$1,584	\$822	\$389	\$1,508	\$4,303
Year ended October 31, 2018	\$1,398	\$710	\$342	\$1,428	\$3,878
Year ended October 31, 2017	\$1,054	\$608	\$338	\$1,189	\$3,189

	United States	Japan	Malaysia	UK	Rest of the World	Total
	(in millions)					
Long-lived assets:						
October 31, 2019	\$314	\$245	\$75	\$177	\$129	\$940
October 31, 2018	\$310	\$222	\$72	\$145	\$121	\$870

21. IMPACT OF NORTHERN CALIFORNIA WILDFIRES

During the week of October 8, 2017, wildfires in northern California adversely impacted the Keysight corporate headquarters site in Santa Rosa, CA. While direct damage to our core facilities was limited, our buildings did experience some smoke and other fire-related impacts. Keysight is insured for the damage caused by the fire.

For the years ended October 31, 2019, 2018 and 2017, we recognized operating expenses of \$3 million, \$97 million and \$18 million, respectively, offset by \$3 million, \$90 million and \$2 million, respectively, of expected insurance recoveries. Expenses were primarily for cleaning and restoration activities, write-off of damaged fixed assets and other direct costs related to recovery from this event.

In 2019 and 2018, we received insurance proceeds of \$22 million and \$68 million, respectively, which has substantially covered our total fire-related expenses in excess of our \$10 million self-insured retention amount. At October 31, 2019, we had a receivable of \$5 million for losses and expenses for which insurance reimbursement is probable. The receivable is included in other current assets in the consolidated balance sheet.

In addition, in 2019 and 2018, we made investments in property, plant and equipment related to fire recovery of \$7 million and \$27 million, respectively, that are expected to be covered by insurance.

Subsequent to October 31, 2019, we received \$37 million of insurance proceeds for replacement of capital and recovery of fire-related expenses. These proceeds will result in an other operating gain of approximately \$32 million in the first quarter of fiscal 2020. No additional insurance proceeds or material expenses related to the 2017 northern California wildfires are expected.

QUARTERLY SUMMARY
(unaudited)

	Three Months Ended			
	January 31,	April 30,	July 31,	October 31,
	(in millions, except per share data)			
2019				
Net revenue	\$1,006	\$1,090	\$1,087	\$1,120
Gross profit	\$ 578	\$ 648	\$ 643	\$ 665
Income from operations	\$ 121	\$ 185	\$ 197	\$ 208
Net income	\$ 114	\$ 153	\$ 159	\$ 195
Net income per share:				
Basic	\$ 0.61	\$ 0.81	\$ 0.85	\$ 1.04
Diluted	\$ 0.60	\$ 0.80	\$ 0.83	\$ 1.02
Weighted average shares used in computing net income per share:				
Basic	187	188	188	187
Diluted	190	191	191	191
2018				
Net revenue	\$ 837	\$ 990	\$1,004	\$1,047
Gross profit	\$ 425	\$ 539	\$ 562	\$ 585
Income (loss) from operations	\$ (17)	\$ 86	\$ 117	\$ (580)
Net income (loss)	\$ 94	\$ 64	\$ 121	\$ (114)
Net income (loss) per share:				
Basic	\$ 0.50	\$ 0.34	\$ 0.64	\$ (0.61)
Diluted	\$ 0.50	\$ 0.34	\$ 0.63	\$ (0.61)
Weighted average shares used in computing net income (loss) per share:				
Basic	187	188	188	187
Diluted	189	190	191	187

RISKS, UNCERTAINTIES AND OTHER FACTORS THAT MAY AFFECT FUTURE RESULTS

Risks Related to Our Business

Failure to introduce successful new solutions and services in a timely manner to address increased competition, rapid technological changes, and changing industry standards could result in our solutions and services becoming obsolete.

We generally sell our solutions in industries that are characterized by increased competition through frequent new solution and service introductions, rapid technological changes and changing industry standards. In addition, many of the markets in which we operate are seasonal and cyclical. Without the timely introduction of new solutions, services and enhancements, our solutions and services will become technologically obsolete over time, in which case our revenue and operating results would suffer. Our ability to offer new solutions and services and to deploy them in a timely manner depend on several factors, including but not limited to our ability to:

- properly identify customer needs;
- innovate and develop new technologies, services and applications;
- successfully commercialize new technologies in a timely manner;
- manufacture and deliver our solutions in sufficient volumes and on time;
- differentiate our offerings from our competitors' offerings;
- price our solutions competitively;
- anticipate our competitors' development of new solutions, services or technological innovations; and
- control product quality in our manufacturing process.

Our future operating results may fluctuate significantly if our investments in innovative technologies are not as profitable as we anticipate.

On a regular basis, we review the existing technologies available in the market and identify strategic new technologies to develop and invest in. We are currently devoting significant resources to the 5G technology and other new technologies in the automotive, battery, Internet of Things, and mobile industries. We are investing in R&D, developing relationships with customers and suppliers, and re-directing our corporate and operational resources to grow within these innovative technologies. Our income could be harmed if we fail to gain sufficient market share, if demand for our solutions is lower than we expect, or if our income related to the innovative technologies is lower than we anticipate. For example, when the 5G standards are published, we may not be able to produce a satisfactory return on investment if our strategic vision and the resources that we are spending on developing our presence in the 5G technology industry turn out to be misaligned with such standards. We provide solutions for the design, development, and manufacturing stages of our customers' workflow. Our customers who currently use our solutions in one stage of their workflow may not use our solutions in other aspects of their manufacturing process.

Uncertainty in general economic conditions may adversely affect our operating results and financial condition.

Our business is sensitive to negative changes in general economic conditions, both inside and outside the United States. Global and regional economic uncertainty or depression may impact our business, resulting in:

- reduced demand for our solutions, delays in the shipment of orders or increases in order cancellations;
- increased risk of excess and obsolete inventories;
- increased price pressure for our solutions and services; and
- greater risk of impairment to the value, and a detriment to the liquidity, of our future investment portfolio.

In addition, global and regional macroeconomic developments, such as increased unemployment, decreased income, reduced access to credit, volatility in capital markets, decreased liquidity, uncertain or destabilizing national election results in the U.S., Europe, and Asia, and negative changes or volatility in general economic conditions in the U.S., Europe, and Asia could negatively affect our ability to conduct business in those territories. Financial difficulties experienced by our suppliers and customers, including distributors, due to economic volatility or negative changes could result in product delays and inventory issues. Economic risks related to accounts receivable could result in delays in collection and greater bad debt expense.

Our operating results and financial condition could be harmed if the markets into which we sell our solutions decline or do not grow as anticipated.

Visibility into our markets is limited. Our quarterly sales and operating results are highly dependent on the volume and timing of technology-related spending and orders received during the fiscal quarter, which are difficult to forecast and may be cancelled by our customers. In addition, our revenues and earnings forecasts for future fiscal quarters are often based on the expected seasonality or cyclical nature of our markets. However, the markets we serve do not always experience the seasonality or cyclical nature that we expect. Any decline in our customers' markets would likely result in a reduction in demand for our solutions and services. The broader semiconductor market is one of the drivers for our business, and therefore, a decrease in the semiconductor market could harm our business. Also, if our customers' markets decline, we may not be able to collect on outstanding amounts due to us. Such declines could harm our financial position, results of operations, cash flows and stock price, and could limit our profitability. Also, in such an environment, pricing pressures could intensify. Since a significant portion of our operating expenses is relatively fixed in nature due to sales, R&D and manufacturing costs, if we were unable to respond quickly enough, these pricing pressures could further reduce our operating margins.

Failure to adjust our purchases due to changing market conditions or failure to estimate our customers' demand could adversely affect our income.

Our income could be harmed if we are unable to adjust our purchases to market fluctuations, including those caused by the seasonal or cyclical nature of the markets in which we operate. The sale of our solutions and services are dependent, to a large degree, on customers whose industries are subject to seasonal or cyclical trends in the demand for their products. For example, the consumer electronics market is particularly volatile, making demand difficult to anticipate. During a market upturn, we may not be able to purchase sufficient supplies or components to meet increasing product demand, which could materially affect our results. In the past, we have seen a shortage of parts for some of our products. In addition, some of the parts that require custom design are not readily available from alternate suppliers due to their unique design or the length of time necessary for design work. Should a supplier cease manufacturing such a component, we would be forced to re-engineer our solution. In addition to discontinuing parts, suppliers may also extend lead times, limit supplies or increase prices due to capacity constraints or other factors. In order to secure components for the production of products, we may continue to enter into non-cancellable purchase commitments with vendors, or at times make advance payments to suppliers, which could impact our ability to adjust our inventory to declining market demands. Prior commitments of this type have resulted in an excess of parts when demand for electronic products has decreased. If demand for our solutions is less than we expect, we may experience additional excess and obsolete inventories and be forced to incur additional charges.

Economic and political policies favoring national interests could adversely affect our results of operations.

Nationalistic economic policies and political trends in the United States, the United Kingdom, the European Union, Singapore, Malaysia and China among other countries, such as opposition to globalization and free trade, sanctions or trade restrictions, withdrawal from or re-negotiation of global trade agreements, tax policies that favor domestic industries and interests, the anticipated exit of the United Kingdom from the European Union (known as Brexit), the distancing or potential exit of other countries from the European Union, and other similar actions may result in increased transaction costs, reduced ability to hire employees, reduced access to supplies and materials, reduced demand or access to customers in international markets, and inability to conduct our operations as they have been conducted historically. Each of these factors may adversely affect our business.

International trade disputes and increased tariffs between the United States and such jurisdictions could substantially change our expectations and ability to operate in such jurisdictions as we have done historically. Many of our suppliers, vendors, customers, partners, and other entities with whom we do business have strong ties to doing business in China. Their ability to supply materials to us, buy products or services from us, or otherwise work with us is affected by their ability to do business in China. If the U.S.'s relationship with China deteriorates or results in trade disputes, trade protection measures, retaliatory actions, tariffs and increased barriers, policies that favor domestic industries, or increased import or export licensing requirements or restrictions, then our deployment of resources in jurisdictions affected by such measures could be misaligned and our operations may be adversely affected due to such changes in the economic and political ecosystem in which our suppliers, vendors, customers, partners, and other entities with whom we do business operate.

A decreased demand for our customers' products or trade restrictions could adversely affect our results of operations.

Our business depends on our customers' ability to manufacture, design, and sell their products in the marketplace. International trade disputes affecting our customers could adversely affect our business. Tariffs on imports to or from China could increase the cost of our customers' components and raw materials, which could make our customers' products and services more expensive and could reduce demand for our customers' products. Protectionist and retaliatory trade measures by either China or the United States could limit our customers' ability to sell their products and services and could reduce demand of our customers' products. Our customers and other entities in our customer chain could decide to take actions in response to international trade disputes that we could not foresee. A decrease in demand or significant change in operations from our customers due to international trade disputes could adversely affect our operating results and financial condition.

In addition to the above, our customers and suppliers could become subject to U.S. export restrictions and sanctions, such as, being added to the U.S. Department of Commerce's "Lists of Parties of Concern" and having U.S. export privileges denied or suspended. In the event that a customer or supplier of ours becomes subject to such sanctions, we will suspend our business with such customer or supplier. Because of the increasingly tense political and economic relationship between the United States and China, such sanctions could be imposed with little notice, which could leave us without an adequate alternative solution to compensate for our inability to continue to do business with such customer or supplier. Some of our suppliers and customers in the supply chain are working on unique solutions and products in the market, and it may be difficult if not impossible to replace them, especially with short notice. We cannot predict what impact future sanctions could have on our customers or suppliers, and therefore, our business. Any export restrictions or sanctions and any tariffs or other trade restriction imposed on our customers or suppliers could adversely affect our financial condition and business.

Economic, political, and other risks associated with international sales and operations could adversely affect our results of operations.

Because we sell our solutions worldwide, our business is subject to risks associated with doing business internationally. We anticipate that revenue from international operations will continue to represent a majority of our total revenue. However, there can be no assurances that our international sales will continue at existing levels or grow in accordance with our effort to increase foreign market penetration. In addition, many of our employees, contract manufacturers, suppliers, job functions and manufacturing facilities are located outside the United States. Accordingly, our future results could be harmed by a variety of factors, including but not limited to:

- changes in a specific country's or region's political, economic or other conditions, including but not limited to changes that favor national interests and economic volatility;
- negative consequences from changes in tax laws;
- difficulty in protecting intellectual property;
- interruption to transportation flows for delivery of parts to us and finished goods to our customers;
- changes in foreign currency exchange rates;
- difficulty in staffing and managing foreign operations;
- local competition;
- differing labor regulations;
- unexpected changes in regulatory requirements;
- inadequate local infrastructure;
- potential incidences of corruption and fraudulent business practices; and
- volatile geopolitical turmoil, including popular uprisings, regional conflicts, terrorism, and war.

We centralize most of our accounting processes at two locations: India and Malaysia. These processes include general accounting, inventory cost accounting, accounts payable and accounts receivables functions. If conditions change in those countries, it may adversely affect operations, including impairing our ability to pay our suppliers. Our results of operations, as well as our liquidity, may be adversely affected and possible delays may occur in reporting financial results.

Further, even if we are able to successfully manage the risks of international operations, our business may be adversely affected if our business partners are not able to successfully manage similar risks.

Dependence on contract manufacturing and outsourcing other portions of our supply chain may adversely affect our ability to bring solutions to market and damage our reputation. Dependence on outsourced information technology and other administrative functions may impair our ability to operate effectively.

As part of our efforts to streamline operations and to cut costs, we outsource aspects of our manufacturing processes and other functions and continue to evaluate additional outsourcing. If our contract manufacturers or other outsourcers fail to perform their obligations in a timely manner or at satisfactory quality levels, our ability to bring solutions to market and our reputation could suffer. For example, during a market upturn, our contract manufacturers may be unable to meet our demand requirements, which may preclude us from fulfilling our customers' orders on a timely basis. The ability of these manufacturers to perform is largely outside of our control. Additionally, changing or replacing our contract manufacturers or other outsourcees could cause disruptions or delays. In addition, we outsource significant portions of our information technology ("IT") and other administrative functions. Since IT is critical to our operations, any failure of our IT providers to perform could impair our ability to operate effectively. In addition to the risks outlined above, problems with manufacturing or IT outsourcing could result in lower revenues and unrealized efficiencies, and could impact our results of operations and stock price. Much of our outsourcing takes place in developing countries and, as a result, may be subject to geopolitical uncertainty.

Our operating results may suffer if our manufacturing capacity does not match the demand for our solutions.

Because we cannot immediately adapt our production capacity and related cost structures to rapidly changing market conditions, when demand does not meet our expectations, our manufacturing capacity will likely exceed our production requirements. During a general market upturn or an upturn in our business, we cannot increase our manufacturing capacity to meet product demand, we will not be able to fulfill orders in a timely manner, which could lead to order cancellations, contract breaches or indemnification obligations. This inability could materially and adversely limit our ability to improve our income, margin and operating results. By contrast, if, during an economic downturn, we had excess manufacturing capacity, then our fixed costs associated with excess manufacturing capacity would adversely affect our income, margins and operating results.

Key customers or large orders may expose us to additional business and legal risks that could have a material adverse impact on our operating results and financial condition.

Certain key customers have substantial purchasing power and leverage in negotiating contractual arrangements with us. These customers may demand contract terms that differ considerably from our standard terms and conditions. Large orders may also include severe contractual liabilities for us if we fail to provide the quantity and quality of product at the required delivery times. While we attempt to contractually limit our potential liability under such contracts, we may have to agree to some or all of these types of provisions to secure these orders and to continue to grow our business. Such actions expose us to significant additional risks, which could result in a material adverse impact on our operating results and financial condition.

Industry consolidation and consolidation among our customer base may lead to increased competition and may harm our operating results.

There is potential for industry consolidation in our markets. As companies attempt to strengthen or hold their market positions in an evolving industry, companies could be acquired or may be unable to continue operations. Companies that are strategic alliance partners in some areas of our business may acquire or form alliances with our competitors, thereby reducing their business with us. We believe that industry consolidation may result in stronger competitors and could lead to more variability in our operating results and could have a material adverse effect on our business, operating results, and financial condition. Furthermore, particularly in the communications market, rapid consolidation would lead to fewer customers, with the effect that loss of a major customer could have a material impact on results not anticipated in a customer marketplace composed of more numerous participants.

Additionally, if there is consolidation among our customer base, our customers may be able to command increased leverage in negotiating prices and other terms of sale, which could adversely affect our profitability. In addition, if, as a result of increased leverage, customer pressures require us to reduce our pricing such that our gross margins are diminished, we could decide not to sell our solutions under such less favorable terms, which would decrease our revenue. Consolidation among our customer base may also lead to reduced demand for our solutions, replacement of our products by the combined entity with those of our competitors and cancellations of orders, each of which could harm our operating results.

Our acquisitions, strategic alliances, joint ventures, internal reorganizations and divestitures may result in financial results that are different than expected.

In the normal course of business, we may engage in discussions with third parties relating to possible acquisitions, strategic alliances, joint ventures and divestitures. Additionally, we occasionally make changes to our internal structure to align business products, services and solutions with market demands and to obtain cost synergies and operational efficiencies. As a result of such transactions, our financial results may differ from our own or the investment community's expectations in a given fiscal quarter, or over the long term. If market conditions or other factors lead us to change our strategic direction, we may not realize the expected value from such transactions or reorganizations. Further, such third-party transactions often have post-closing arrangements, including, but not limited to, post-closing adjustments, transition services, escrows or indemnifications, the financial results of which can be difficult to predict. In addition, acquisitions and strategic alliances may require us to integrate a different company culture, management team, employees and business infrastructure into our existing operations without impacting the business operations of the newly acquired company. We may have difficulty developing, manufacturing and marketing the products of a newly acquired company in a way that enhances performance and expands the markets of the newly acquired company. The acquired company may not enhance the performance of our businesses or product lines such that we do not realize the value from expected synergies. Depending on the size and complexity of an acquisition, the successful integration of the entity depends on a variety of factors, including but not limited to:

- the achievement of anticipated cost savings, synergies, business opportunities and growth prospects from combining the acquired company;
- the scalability of production, manufacturing and marketing of products of a newly acquired company to broader adjacent markets;
- the ability to cohesively integrate operations, product definitions, price lists, delivery, and technical support for products and solutions of a newly acquired company into our existing operations;
- the compatibility of our infrastructure, operations, policies and organizations with those of the acquired company;
- the retention of key employees and/or customers;
- the management of facilities and employees in different geographic areas; and
- the management of relationships with our strategic partners, suppliers, and customer base.

If we do not realize the expected benefits or synergies of such transactions, our consolidated financial position, results of operations, cash flows and stock price could be negatively impacted. Additionally, we may record significant goodwill and other assets as a result of acquisitions or investments, and we may be required to incur impairment charges, which could adversely affect our consolidated financial position and results of operations.

Any inability to complete acquisitions on acceptable terms could negatively impact our growth rate and financial performance.

Our ability to grow revenues, earnings and cash flow depends in part upon our ability to identify and successfully acquire and integrate businesses at appropriate prices and realize anticipated synergies and business performance. Appropriate targets for acquisition are difficult to identify and complete for a variety of reasons, including but not limited to, limited due diligence, high valuations, business and intellectual property evaluations, other interested parties, negotiations of the definitive documentation, satisfaction of closing conditions, the need to obtain antitrust or other regulatory approvals on acceptable terms, and availability of funding. The inability to close appropriate acquisitions on acceptable terms could adversely impact our growth rate, revenue, and financial performance.

We may need additional financing in the future to meet our capital needs or to make opportunistic acquisitions, and such financing may not be available on terms favorable to us, if at all, and may be dilutive to existing shareholders.

We may need to seek additional financing for our general corporate purposes. For example, we may need to increase our investment in R&D activities or need funds to make acquisitions. We may be unable to obtain any desired additional financing on terms favorable to us, if at all. If adequate funds are not available on acceptable terms, we may be unable to fund our expansion, successfully develop or enhance solutions or respond to competitive pressures, any of which could negatively affect our business. If we finance acquisitions by issuing additional convertible debt or equity securities, our existing stockholders may experience share dilution, which could affect the market price of our stock. If we raise additional funds through the issuance of equity securities, our shareholders will experience dilution of their ownership interest. If we raise additional funds by issuing debt, we may be subject to further limitations on our operations and ability to pay dividends due to restrictive covenants.

We have outstanding debt and may incur other debt in the future, which could adversely affect our financial condition, liquidity and results of operations.

We currently have outstanding debt as well as availability to borrow under a revolving credit facility. We may borrow additional amounts in the future and use the proceeds from any future borrowing for general corporate purposes, future acquisitions, expansion of our business or repurchases of our outstanding shares of common stock.

Our incurrence of this debt, and increases in our aggregate levels of debt, may adversely affect our operating results and financial condition by, among other things:

- requiring a portion of our cash flow from operations to make interest payments on this debt;
- increasing our vulnerability to general adverse economic and industry conditions;
- reducing the cash flow available to fund capital expenditures and other corporate purposes and to grow our business; and
- limiting our flexibility in planning for, or reacting to, changes in our business and the industry.

Our current revolving credit facility and term loan imposes restrictions on us, including restrictions on our ability to create liens on our assets and the ability of our subsidiaries to incur indebtedness, and requires us to maintain compliance with specified financial ratios. Our ability to comply with these ratios may be affected by events beyond our control. In addition, the indenture governing our senior notes contains covenants that may adversely affect our ability to incur certain liens or engage in certain types of sale and leaseback transactions. If we breach any of the covenants and do not obtain a waiver from the lenders, then, subject to applicable cure periods, our outstanding indebtedness could be declared immediately due and payable.

If currency exchange rates fluctuate substantially in the future, our financial results could be adversely affected.

A substantial amount of our solutions are priced and paid for in U.S. Dollars, although many of our solutions are priced in local currencies and a significant amount of certain types of expenses, such as payroll, utilities, tax and marketing expenses, are paid in local currencies. Our hedging programs are designed to reduce, but not entirely eliminate, within any given 12-month period, the impact of currency exchange rate movements, including those caused by currency controls, which could impact our business, operating results and financial condition by resulting in lower revenue or increased expenses. However, for expenses beyond a 12-month period, our hedging strategy will not mitigate our exchange rate risk. In addition, our currency hedging programs involve third-party financial institutions as counterparties. The weakening or failure of these counterparties may adversely affect our hedging programs and our financial condition through, among other things, a reduction in the number of available counterparties, increasingly unfavorable terms or the failure of counterparties to perform under hedging contracts.

Third parties may claim that we are infringing their intellectual property rights, and we could suffer significant litigation or licensing expenses or be prevented from selling solutions or services.

Third parties may claim that one or more of our solutions or services infringe their intellectual property rights. We analyze and take action in response to such claims on a case-by-case basis. Any dispute or litigation regarding patents or other intellectual property could be costly and time-consuming due to the complexity of our technology and the uncertainty of intellectual property litigation and could divert our management and key personnel from

business operations. A claim of intellectual property infringement could cause us to enter into a costly or restrictive license agreement (which may not be available under acceptable terms, or at all), require us to redesign certain of our solutions (which would be costly and time-consuming) and/or subject us to significant damages or an injunction against the development and sale of certain solutions or services. In certain of our businesses, we rely on third-party intellectual property licenses, and we cannot ensure that these licenses will be available to us in the future on terms favorable to us or at all.

Third parties may infringe our intellectual property rights, and we may suffer competitive injury or expend significant resources enforcing our intellectual property rights.

Our success depends in part on our proprietary technology, including technology we obtained through acquisitions. We rely on various intellectual property rights, including patents, copyrights, trademarks and trade secrets, as well as confidentiality provisions and licensing arrangements, to establish our proprietary rights. If we do not enforce our intellectual property rights successfully, our competitive position may suffer, which could harm our operating results.

Our pending patent, copyright and trademark registration applications may not be allowed or competitors may challenge the validity or scope of our patents, copyrights or trademarks. In addition, our patents, copyrights, trademarks and other intellectual property rights may not provide us with a significant competitive advantage. In preparation for the separation and distribution, we have applied for trademarks related to our new global brand name in various jurisdictions worldwide. Any successful opposition to our applications in material jurisdictions could impose material costs on us or make it more difficult to protect our brand. Different jurisdictions vary widely in the level of protection and priority they give to trademark and other intellectual property rights.

We may be required to spend significant resources monitoring our intellectual property rights, and we may or may not be able to detect infringement of such rights by third parties. Our competitive position may be harmed if we cannot detect infringement and enforce our intellectual property rights in a timely manner, or at all. In some circumstances, we may choose to not pursue enforcement due to a variety of reasons. In addition, competitors may avoid infringement by designing around our intellectual property rights or by developing non-infringing competing technologies. Intellectual property rights and our ability to enforce them may be unavailable or limited in some countries, which could make it easier for competitors to capture market share and could result in lost revenues to the company. Furthermore, some of our intellectual property is licensed to others, which allows them to compete with us using that intellectual property.

If we experience a significant cybersecurity attack or disruption in our IT systems, our business, reputation, and operating results could be adversely affected.

We rely on several centralized IT systems to provide solutions and services, maintain financial records, retain sensitive data such as intellectual property, proprietary business information, and data related to customers, suppliers, and business partners, process orders, manage inventory, process shipments to customers and operate other critical functions. The ongoing maintenance and security of this information is pertinent to the success of our business operations and our strategic goals.

Despite our implementation of network security measures, our network may be vulnerable to cybersecurity attacks, computer viruses, break-ins and similar disruptions. Our network security measures include, but are not limited to, the implementation of firewalls, antivirus protection, patches, log monitors, routine backups, offsite storage, network audits, and routine updates and modifications. Despite our efforts to create these security barriers, we may not be able to keep pace as new threats emerge and it is virtually impossible for us to entirely eliminate this risk. Cybersecurity attacks are evolving and include, but are not limited to, malicious software, attempts to gain unauthorized access to data, and other electronic security breaches that could lead to disruptions in systems, unauthorized release of confidential or otherwise protected information and corruption of data. Any such event could have a material adverse effect on our business, reputation, operating results and financial condition, and no assurance can be given that our efforts to reduce the risk of such attacks will be successful.

In addition, our IT systems may be susceptible to damage, disruptions or shutdowns due to power outages, hardware failures, telecommunication failures, user errors, implementation of new operational systems or software or upgrades to existing systems and software, or catastrophes or other unforeseen events. Such events could result in the disruption of business processes, network degradation and system downtime, along with the potential that a third party will exploit our critical assets such as intellectual property, proprietary business information and data

related to our customers, suppliers and business partners. Further, such events could result in loss of revenue, loss of or reduction in purchase orders, inability to report financial information, litigation, regulatory fines and penalties, and other damage that could have a material impact on our business operations. To the extent that such disruptions occur, our customers and partners may lose confidence in our solutions and we may lose business or brand reputation, resulting in a material and adverse effect on our business operating results and financial condition.

We are or will be subject to ongoing tax examinations of our tax returns by the IRS and other tax authorities. An adverse outcome of any such audit or examination by the IRS or other tax authority could have a material adverse effect on our results of operations, financial condition and liquidity.

We are or will be subject to ongoing tax examinations of our tax returns by the IRS and other tax authorities in various jurisdictions. We regularly assess the likelihood of adverse outcomes resulting from ongoing tax examinations to determine the adequacy of our provision for income taxes. These assessments can require considerable estimates and judgments. Intercompany transactions associated with the sale of inventory, services, intellectual property and cost sharing arrangements are complex and affect our tax liabilities. The calculation of our tax liabilities involves uncertainties in the application of complex tax laws and regulations in multiple jurisdictions. The outcomes of these tax examinations could have an adverse effect on our operating results and financial condition. Due to the complexity of tax contingencies, the ultimate resolution of any tax matters related to operations may result in payments greater or less than amounts accrued.

Our operations may be adversely impacted by changes in our business mix or changes in the tax legislative landscape.

Our effective tax rate may be adversely impacted by, among other things, changes in the mix of our earnings among countries with differing statutory tax rates, changes in the valuation allowance of deferred tax assets, and changes in tax laws. We cannot give any assurance as to what our effective tax rate will be in the future because, among other things, there is uncertainty regarding the tax policies of the jurisdictions where we operate. Changes in tax laws, such as tax reform in the United States or changes in tax laws resulting from the Organization for Economic Co-operation and Development's ("OECD") multi-jurisdictional plan of action to address "base erosion and profit shifting" and the taxation of the "Digital Economy" could impact our effective tax rate.

If tax laws or incentives change or cease to be in effect, our income taxes could increase significantly.

We are subject to federal, state, and local taxes in the United States and numerous foreign jurisdictions. We devote significant resources to evaluating our tax positions and our worldwide provision for taxes. Our financial results and tax treatment are susceptible to changes in tax, accounting, and other laws, regulations, principles, and interpretations in the United States and in other jurisdictions where we do business. With the rise of economic and political policies that favor domestic interests, it is possible that more countries will enact tax laws that either increase the tax rates, or reduce or change the tax incentives available to multinational companies like ours. Upon a change in tax laws in any territory where we do significant business, such as the U.S., the European Union, or Singapore, we may not be able to maintain our current tax rate or qualify for or maintain the benefits of any tax incentives offered, to the extent such incentives are offered.

We currently benefit from tax incentives extended to certain of our foreign subsidiaries to encourage investment or employment, the most significant of which being Singapore. The Singapore tax incentives require that specific conditions be satisfied, which include achieving thresholds of employment, ownership of certain assets, as well as specific types of investment activities within Singapore. Based on the current tax environment, we believe that we will satisfy such conditions in the future as needed, but cannot guarantee that the tax environment will not change or that such conditions will be satisfied.

Our Singapore tax incentives are due for renewal in fiscal 2024, but we cannot guarantee that Singapore will not revoke the tax incentives earlier. Our taxes could increase if the existing Singapore incentives are not renewed upon revocation or expiration. We cannot guarantee that we will qualify for any new incentive regime that may exist in fiscal 2024, or that such conditions will be satisfied. If we cannot or do not wish to satisfy all or portions of the tax incentives conditions, we may lose the related tax incentives and could be required to refund the benefits that the tax incentives previously provided. As a result, our effective tax rate could be higher than it would have been had we maintained the benefits of the tax incentives and could harm our operating results.

Our business will suffer if we are not able to retain and hire key personnel.

Our future success depends partly on the continued service of our key research, engineering, sales, marketing, manufacturing, executive and administrative personnel, including personnel joining our company through acquisitions. The markets in which we operate are dynamic, and we may need to respond with reorganizations, workforce reductions and site closures from time to time. We believe our pay levels are competitive within the regions that we operate. However, there is also intense competition for certain highly technical specialties in geographic areas in which we operate, and it may become more difficult to retain key employees. If we fail to retain and hire a sufficient number of these personnel, we may not be able to meet key objectives, such as launching effective product innovations and meeting financial goals, and maintain or expand our business.

If we suffer a loss to our factories, facilities or distribution system due to a catastrophic event, our operations could be significantly harmed.

Our factories, facilities and distribution system are subject to catastrophic loss due to fire, flood, terrorism or other natural or man-made disasters. In particular, several of our facilities could be subject to a catastrophic loss caused by earthquake or other natural disasters due to their locations. For example, our production facilities, headquarters and laboratories in California and our production facilities in Japan are all located in areas with above-average seismic activity. If any of these facilities were to experience a catastrophic loss, it could disrupt our operations, delay production, shipments and revenue and result in large expenses to repair or replace the facility. If such a disruption were to occur, we could breach our agreements, our reputation could be harmed and our business and operating results could be adversely affected. In addition, since we have consolidated our manufacturing facilities, we are more likely to experience an interruption to our operations in the event of a catastrophe in any one location. Although we carry insurance for property damage and business interruption, we do not carry insurance or financial reserves for interruptions or potential losses arising from earthquakes or terrorism. Also, our third-party insurance coverage will vary from time to time in both type and amount depending on availability, cost and our decision with respect to risk retention. Economic conditions and uncertainties in global markets may adversely affect the cost and other terms upon which we are able to obtain third-party insurance. If our third-party insurance coverage is adversely affected, or to the extent we have elected to self-insure, we may be at a greater risk that our operations will be harmed by a catastrophic loss.

If we fail to maintain satisfactory compliance with certain regulations, we may be subject to substantial negative financial consequences and civil or criminal penalties.

We and our customers are subject to various significant international, federal, state and local regulations, including, but not limited to, health and safety, packaging, data privacy, product content, labor and import/export regulations. These regulations are complex, change frequently and have tended to become more stringent over time. We may be required to incur significant expenses to comply with these regulations or to remedy violations of these regulations. Any failure by us to comply with applicable government regulations could also result in cessation of our operations or portions of our operations, high financial penalties, product recalls or impositions of fines, and restrictions on our ability to carry on or expand our operations. If demand for our solutions is adversely affected or our costs increase, our business would suffer.

We have developed internal data handling policies and practices to comply with the General Data Protection Regulation (“GDPR”) in the European Union and data privacy regulations similar to GDPR in other jurisdictions. Our existing business strategy does not rely on aggregating or selling personally identifiable information, and as a general matter Keysight does not process personally identifiable information on behalf of our customers. We devote resources to keep up with the changing regulatory environment on data privacy in the jurisdictions where we do business. Despite our efforts, no assurance can be given that we will be compliant with data privacy regulations. New laws, amendments, or interpretations of regulations, industry standards, and contractual obligations relating to data privacy may require us to incur additional costs and restrict our business operations. If we fail to comply with GDPR or other data privacy regulation, we may be subject to significant financial fines and civil or criminal penalties, and may suffer damage to our reputation or brand, which could adversely affect our business and financial results.

In addition, our products and operations are also often subject to the rules of industrial standards bodies, like the International Standards Organization, as well as regulation by other agencies such as the U.S. Federal Communications Commission. We also must comply with work safety rules. If we fail to adequately address any of these regulations, our businesses could be harmed.

Failure to comply with anti-corruption laws could adversely affect our business and result in financial penalties.

Because we have extensive international operations, we must comply with complex foreign and U.S. laws and regulations, such as the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act and other local laws prohibiting corrupt payments to governmental officials, and anti-competition regulations. Although we actively maintain policies and procedures designed to ensure ongoing compliance with these laws and regulations, there can be no assurance that our employees, contractors or agents will not violate these policies and procedures. Violations of these laws and regulations could result in fines and penalties, criminal sanctions, restrictions on our business conduct and on our ability to offer our solutions in one or more countries, and could also materially affect our brand, ability to attract and retain employees, international operations, business and operating results.

Our business and financial results may be adversely affected by various legal and regulatory proceedings.

We are subject to legal proceedings, lawsuits and other claims in the normal course of business and could become subject to additional claims in the future, some of which could be material. The outcome of existing proceedings, lawsuits and claims may differ from our expectations because the outcomes of litigation are often difficult to reliably predict. Various factors or developments can lead us to change current estimates of liabilities and related insurance receivables where applicable, or permit us to make such estimates for matters previously not susceptible to reasonable estimates, such as a significant judicial ruling or judgment, a significant settlement, significant regulatory developments or changes in applicable law. A future adverse ruling, settlement or unfavorable development could result in charges that could adversely affect our business, operating results or financial condition.

Our internal controls may be determined to be ineffective, which may adversely affect investor confidence in our company, the value of our stock, and our access to capital.

The Sarbanes-Oxley Act of 2002 requires us to furnish a report by management on the effectiveness of our internal control over financial reporting, among other things. We are devoting significant resources and time to comply with such internal control over financial reporting requirements. However, we cannot be certain that these measures will ensure that we design, implement and maintain adequate control over our financial processes and reporting in the future, especially in the context of acquisitions of other businesses. Any difficulties in the assimilation of acquired businesses into our control system could harm our operating results or cause us to fail to meet our financial reporting obligations. Inferior internal controls could also cause investors to lose confidence in our reported financial information, which could have a negative effect on the trading price of our stock or on our access to capital, or cause us to be subject to investigation or sanctions by the SEC.

Adverse conditions in the global banking industry and credit markets may adversely impact the value of our cash investments or impair our liquidity.

Our cash and cash equivalents are invested or held in a mix of money market funds, time deposit accounts and bank demand deposit accounts. Disruptions in the financial markets may, in some cases, result in an inability to access assets such as money market funds that traditionally have been viewed as highly liquid. Any failure of our counterparty financial institutions or funds in which we have invested may adversely impact our cash and cash equivalent positions and, in turn, our results and financial condition.

Future investment returns on pension assets may be lower than expected or interest rates may decline, requiring us to make significant additional cash contributions to our future plans.

We sponsor several defined benefit pension plans that cover many of our salaried and hourly employees. The Federal Pension Protection Act of 2006 requires that certain capitalization levels be maintained in each of the U.S. plans, and there may be similar funding requirements in the plans outside the United States. Because it is unknown what the investment return on and the fair value of our pension assets will be in future years or what interest rates and discount rates may be at any point in time, no assurances can be given that applicable law will not require us to make future material plan contributions. Any such contributions could adversely affect our financial condition.

Environmental contamination from past operations could subject us to unreimbursed costs and could harm on-site operations and the future use and value of the properties involved, and environmental contamination caused by ongoing operations could subject us to substantial liabilities in the future.

Some of our properties are undergoing remediation by HP Inc. ("HP") for subsurface contaminations that were known at the time of Agilent's separation from HP in 1999. In connection with Agilent's separation from HP, HP and Agilent entered into an agreement pursuant to which HP agreed to retain the liability for this subsurface

contamination, perform the required remediation and indemnify Agilent with respect to claims arising out of that contamination. Agilent has assigned its rights and obligations under this agreement to Keysight in respect of facilities transferred to us in the separation. As a result, HP will have access to a limited number of our properties to perform remediation. Although HP agreed to minimize interference with on-site operations at such properties, remediation activities and subsurface contamination may require us to incur unreimbursed costs and could harm on-site operations and the future use and value of the properties. In connection with the separation, Agilent will indemnify us directly for any liabilities related thereto. We cannot be sure that HP will continue to fulfill its remediation obligations or that Agilent will continue to fulfill its indemnification obligations.

In connection with the separation from Agilent, Agilent also agreed to indemnify us for any liability associated with contamination from past operations at all properties transferred from Agilent to Keysight. We cannot be sure that Agilent will fulfill its indemnification obligations.

Our current manufacturing processes involve the use of substances regulated under various international, federal, state and local laws governing the environment. As a result, we may become subject to liabilities for environmental contamination, and these liabilities may be substantial. Although our policy is to apply strict standards for environmental protection at our sites inside and outside the United States, even if the sites outside the United States are not subject to regulations imposed by foreign governments, we may not be aware of all conditions that could subject us to liability.

Risks Related to Our Common Stock

Our share price may fluctuate significantly.

Our common stock is listed on NYSE under the ticker symbol “KEYS.” The market price of our common stock may fluctuate widely, depending on many factors, some of which may be beyond our control, including but not limited to:

- actual or anticipated fluctuations in our operating results due to factors related to our business;
- success or failure of our business strategy;
- our quarterly or annual earnings, or those of other companies in our industry;
- our ability to obtain third-party financing as needed;
- announcements by us or our competitors of significant acquisitions or dispositions;
- changes in accounting standards, policies, guidance, interpretations or principles;
- the failure of securities analysts to cover our common stock;
- changes in earnings estimates by securities analysts or our ability to meet those estimates;
- the operating and share price performance of other comparable companies;
- investor perception of our company;
- natural or other disasters that investors believe may affect us;
- overall market fluctuations;
- results from any material litigation or government investigations;
- changes in laws or regulations affecting our business; and
- general economic conditions and other external factors.

Stock markets in general have experienced volatility that has often been unrelated to the operating performance of a particular company. These broad market fluctuations could adversely affect the trading price of our common stock.

In addition, when the market price of a company’s shares drops significantly, shareholders often institute securities class action lawsuits against the company. A lawsuit against us could cause us to incur substantial costs and could divert the time and attention of management and other resources.

We do not currently pay dividends on our common stock.

We do not currently pay dividends on our common stock. The payment of any dividends in the future, and the timing and amount thereof, to our stockholders fall within the discretion of our board of directors. The board's decisions regarding the payment of dividends will depend on many factors, such as our financial condition, earnings, capital requirements, debt service obligations, restrictive covenants in our debt, industry practice, legal requirements, regulatory constraints and other factors that the board deems relevant. We cannot guarantee that we will pay a dividend in the future or continue to pay any dividends if we commence paying dividends.

Certain provisions in our amended and restated certificate of incorporation and bylaws, and of Delaware law, may prevent or delay an acquisition of the company, which could decrease the trading price of our common stock.

Our amended and restated certificate of incorporation and amended and restated bylaws contain, and Delaware law contains, provisions that are intended to deter coercive takeover practices and inadequate takeover bids by making such practices or bids unacceptably expensive to the bidder and to encourage prospective acquirers to negotiate with our board of directors rather than to attempt a hostile takeover. These provisions include but are not limited to:

- the inability of our shareholders to call a special meeting;
- the inability of our shareholders to act without a meeting of shareholders;
- rules regarding how shareholders may present proposals or nominate directors for election at shareholder meetings;
- the right of our board to issue preferred stock without shareholder approval;
- the division of our board of directors into three classes of directors, with each class serving a staggered three-year term, and this classified board provision could have the effect of making the replacement of incumbent directors more time consuming and difficult;
- a provision that shareholders may only remove directors with cause;
- the ability of our directors, and not shareholders, to fill vacancies on our board of directors; and
- the requirement that the affirmative vote of shareholders holding at least 80 percent of our voting stock is required to amend certain provisions in our amended and restated certificate of incorporation (relating to the number, term and removal of our directors, the filling of our board vacancies, the advance notice to be given for nominations for elections of directors, the calling of special meetings of shareholders, shareholder action by written consent, the ability of the board of directors to amend the bylaws, elimination of liability of directors to the extent permitted by Delaware law, exclusive forum for certain types of actions and proceedings that may be initiated by our shareholders and amendments of the certificate of incorporation) and certain provisions in our amended and restated bylaws (relating to the calling of special meetings of shareholders, the business that may be conducted or considered at annual or special meetings, the advance notice of shareholder business and nominations, shareholder action by written consent, the number, tenure, qualifications and removal of our directors, the filling of our board vacancies, director and officer indemnification and amendments of the bylaws).

In addition, because we have not chosen to be exempt from Section 203 of the Delaware General Corporation Law (the "DGCL"), this provision could also delay or prevent a change of control that some shareholders may favor. Section 203 provides that, subject to limited exceptions, persons that acquire, or are affiliated with a person that acquires, more than 15 percent of the outstanding voting stock of a Delaware corporation (an "interested stockholder") shall not engage in any business combination with that corporation, including by merger, consolidation or acquisitions of additional shares, for a three-year period following the date on which the person became an interested stockholder, unless (i) prior to such time, the board of directors of such corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder; (ii) upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85 percent of the voting stock of such corporation at the time the transaction commenced (excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) the voting stock owned by directors who are also officers or held in employee benefit plans in which the employees do not have a confidential right to tender or vote stock held by the plan); or (iii) on or subsequent to such time the business combination is approved by the board of directors of such corporation and

authorized at a meeting of shareholders by the affirmative vote of at least two-thirds of the outstanding voting stock of such corporation not owned by the interested stockholder.

We believe these provisions will protect our shareholders from coercive or otherwise unfair takeover tactics by requiring potential acquirers to negotiate with our board of directors and by providing our board of directors with more time to assess any acquisition proposal. These provisions are not intended to make us immune from takeovers. However, these provisions will apply even if the offer may be considered beneficial by some shareholders and could delay or prevent an acquisition that our board of directors determines is not in the best interests of the company and our shareholders. These provisions may also prevent or discourage attempts to remove and replace incumbent directors.

Our amended and restated certificate of incorporation designates that the state courts in the State of Delaware or, if no state court located within the State of Delaware has jurisdiction, the federal court for the District of Delaware, as the sole and exclusive forum for certain types of actions and proceedings that may be initiated by our shareholders, which could discourage lawsuits against the company and our directors and officers.

Our amended and restated certificate of incorporation provide that unless the board of directors otherwise determines, the state courts in the State of Delaware or, if no state court located within the State of Delaware has jurisdiction, the federal court for the District of Delaware, will be the sole and exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a claim of breach of a fiduciary duty owed by any of our directors or officers to the company or our shareholders, any action asserting a claim against us or any of our directors or officers arising pursuant to any provision of the DGCL or Keysight's amended and restated certificate of incorporation or bylaws, or any action asserting a claim against us or any of our directors or officers governed by the internal affairs doctrine. This exclusive forum provision may limit the ability of our shareholders to bring a claim in a judicial forum that such shareholders find favorable for disputes with us or our directors or officers, which may discourage such lawsuits against us and our directors and officers.

CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management has evaluated, under the supervision and with the participation of our Chief Executive Officer and Chief Financial Officer, the effectiveness of our disclosure controls and procedures as of October 31, 2019, pursuant to and as required by Rule 13a-15(b) under the Securities Exchange Act of 1934 (“Exchange Act”). Based on that evaluation, our Chief Executive Officer and Chief Financial Officer have concluded that, as of October 31, 2019, the company’s disclosure controls and procedures, as defined by Rule 13a-15(e) under the Exchange Act, were effective and designed to ensure that (i) information required to be disclosed in the company’s reports filed under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms, and (ii) information is accumulated and communicated to management, including the Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosures.

Management’s Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on the results of this evaluation, our management concluded that our internal control over financial reporting was effective as of October 31, 2019.

The effectiveness of our internal control over financial reporting as of October 31, 2019 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears in Item 8 of the Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

Effective November 1, 2018, we adopted *Accounting Standards Update (“ASU”) 2014-09, Revenue From Contracts With Customers*. Although the new revenue standard is expected to have an immaterial impact on our ongoing net income, we did implement changes to our processes and control activities related to revenue recognition, including changes to our information systems. These included the development of new policies based on the five-step model provided in the new revenue standard, new training, ongoing contract review requirements, and gathering of information provided for disclosures. There were no other changes in our internal control over financial reporting during the year ended October 31, 2019 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

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