

We experienced a gross margin percentage increase in our Americas segment due to productivity improvements, partially offset by unfavorable impacts from pricing and product mix. The unfavorable product mix impact was driven by products within the Infrastructure Platforms product category. Our gross margin in this segment also benefited from the sale of our lower margin SPVSS business during the second quarter of fiscal 2019.

Product gross margin in our EMEA segment increased due to productivity improvements, partially offset by negative impacts from pricing and mix.

The APJC segment gross margin percentage decrease was due to negative impacts from pricing, partially offset by productivity improvements and favorable product mix. Lower service gross margin also contributed to the decrease in the gross margin in this geographic segment.

The gross margin percentage for a particular segment may fluctuate, and period-to-period changes in such percentages may or may not be indicative of a trend for that segment.

Research and Development (“R&D”), Sales and Marketing, and General and Administrative (“G&A”) Expenses

R&D, sales and marketing, and G&A expenses are summarized in the following table (in millions, except percentages):

	Years Ended			2019 vs. 2018	
	July 27, 2019	July 28, 2018	July 29, 2017	Variance in Dollars	Variance in Percent
Research and development	\$ 6,577	\$ 6,332	\$ 6,059	\$ 245	4%
<i>Percentage of revenue</i>	<i>12.7%</i>	<i>12.8%</i>	<i>12.6%</i>		
Sales and marketing	9,571	9,242	9,184	329	4%
<i>Percentage of revenue</i>	<i>18.4%</i>	<i>18.7%</i>	<i>19.1%</i>		
General and administrative	1,827	2,144	1,993	(317)	(15)%
<i>Percentage of revenue</i>	<i>3.5%</i>	<i>4.3%</i>	<i>4.2%</i>		
Total	\$ 17,975	\$ 17,718	\$ 17,236	\$ 257	1%
<i>Percentage of revenue</i>	<i>34.6%</i>	<i>35.9%</i>	<i>35.9%</i>		

R&D Expenses

R&D expenses increased due to higher headcount-related expenses and, to a lesser extent, higher acquisition-related costs, higher contracted services and higher discretionary spending.

We continue to invest in R&D in order to bring a broad range of products to market in a timely fashion. If we believe that we are unable to enter a particular market in a timely manner with internally developed products, we may purchase or license technology from other businesses, or we may partner with or acquire businesses as an alternative to internal R&D.

Sales and Marketing Expenses

Sales and marketing expenses increased due to higher headcount-related expenses, higher discretionary spending and, to a lesser extent, higher contracted services and higher acquisition-related costs, partially offset by lower share-based compensation expense.

G&A Expenses

G&A expenses decreased due to a benefit from the \$400 million litigation settlement with Arista Networks and lower contracted services, partially offset by higher discretionary spending and higher headcount-related expenses.

Effect of Foreign Currency

In fiscal 2019, foreign currency fluctuations, net of hedging, decreased the combined R&D, sales and marketing, and G&A expenses by approximately \$233 million, or 1.3%, compared with fiscal 2018. In fiscal 2018, foreign currency fluctuations, net of hedging, increased the combined R&D, sales and marketing, and G&A expenses by approximately \$93 million, or 0.5%, compared with fiscal 2017.