UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended June 27, 2020

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission File Number: 001-34674

Calix, Inc.
(Exact Name of Registrant as Specified in Its Charter)

Delaware	**68-0438710**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**

2777 Orchard Parkway, San Jose, CA 95134
(Address of Principal Executive Offices) (Zip Code)

(408) 514-3000
(Registrant's Telephone Number, Including Area Code)

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

Title of Each Class	Trading Symbol	Name of Each Exchange on Which Registered
Common Stock, par value $0.025 per share	CALX	New York Stock Exchange

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes: ☒ No: ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes: ☒ No: ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large Accelerated Filer	☐	Accelerated Filer	☒
Non-accelerated filer	☐	Smaller Reporting Company	☐
Emerging Growth Company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

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

As of July 15, 2020, there were 58,201,647 shares of the Registrant’s common stock, par value $0.025 outstanding.

CALIX, INC.

FORM 10-Q

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PART I. FINANCIAL INFORMATION

ITEM 1. Financial Statements

CALIX, INC.

CONDENSED CONSOLIDATED BALANCE SHEETS
(In thousands, except par value)

	June 27, 2020 (Unaudited)	December 31, 2019 (See Note 1)
ASSETS		
Current assets:		
Cash and cash equivalents	$ 50,552	$ 46,829
Restricted cash	628	628
Accounts receivable, net	58,590	46,509
Inventory	36,659	40,153
Prepaid expenses and other current assets	11,640	9,698
Total current assets	158,069	143,817
Property and equipment, net	20,966	21,527
Right-of-use operating leases	11,079	15,864
Goodwill	116,175	116,175
Other assets	15,025	19,440
	$ 321,314	$ 316,823
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 10,204	$ 10,789
Accrued liabilities	64,684	57,546
Deferred revenue	16,359	17,158
Line of credit	26,000	30,000
Total current liabilities	117,247	115,493
Long-term portion of deferred revenue	18,192	18,340
Operating leases	12,975	14,337
Other long-term liabilities	13,732	14,625
Total liabilities	162,146	162,795
Commitments and contingencies (See Note 6)		
Stockholders' equity:		
Preferred stock, $0.025 par value; 5,000 shares authorized; no shares issued and outstanding as of June 27, 2020 and December 31, 2019	—	—
Common stock, $0.025 par value; 100,000 shares authorized; 63,473 shares issued and 58,143 shares outstanding as of June 27, 2020, and 61,778 shares issued and 56,448 shares outstanding as of December 31, 2019	1,587	1,545
Additional paid-in capital	912,402	895,899
Accumulated other comprehensive loss	(1,103)	(854)
Accumulated deficit	(713,732)	(702,576)
Treasury stock, 5,330 shares as of June 27, 2020 and December 31, 2019	(39,986)	(39,986)
Total stockholders' equity	159,168	154,028
	$ 321,314	$ 316,823

See accompanying notes to condensed consolidated financial statements.

CALIX, INC.

CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(In thousands, except per share data)
(Unaudited)

	Three Months Ended		Six Months Ended	
	June 27, 2020	June 29, 2019	June 27, 2020	June 29, 2019
Revenue:				
Systems	$ 110,841	$ 92,833	$ 205,350	$ 175,193
Services	8,182	7,471	15,355	14,461
Total revenue	119,023	100,304	220,705	189,654
Cost of revenue:				
Systems	56,721	49,561	107,429	94,162
Services	5,897	6,075	11,247	12,481
Total cost of revenue	62,618	55,636	118,676	106,643
Gross profit	56,405	44,668	102,029	83,011
Operating expenses:				
Research and development	20,921	20,700	41,592	40,030
Sales and marketing	21,343	19,734	41,967	39,073
General and administrative	11,193	9,165	21,862	17,952
Restructuring charges	6,286	—	6,286	—
Total operating expenses	59,743	49,599	111,707	97,055
Loss from operations	(3,338)	(4,931)	(9,678)	(14,044)
Interest and other expense, net:				
Interest expense, net	(617)	(142)	(907)	(250)
Other income (expense), net	(109)	123	(94)	(268)
Total interest and other expense, net	(726)	(19)	(1,001)	(518)
Loss before provision for income taxes	(4,064)	(4,950)	(10,679)	(14,562)
Provision for income taxes	148	95	477	250
Net loss	$ (4,212)	$ (5,045)	$ (11,156)	$ (14,812)
Net loss per common share:				
Basic and diluted	$ (0.07)	$ (0.09)	$ (0.20)	$ (0.27)
Weighted-average number of shares used to compute				
net loss per common share:				
Basic	57,261	54,624	56,906	54,339
Diluted	57,261	54,624	56,906	54,339
Net loss	$ (4,212)	$ (5,045)	$ (11,156)	$ (14,812)
Other comprehensive income (loss), net of tax - foreign currency translation adjustments, net	3	(223)	249	43
Comprehensive loss	$ (4,209)	$ (5,268)	$ (10,907)	$ (14,769)

See accompanying notes to condensed consolidated financial statements.

CALIX, INC.

CONDENSED CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
(In thousands, unaudited)

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Treasury Stock	Total Stockholders' Equity
	Shares	Amount					
Balance at March 28, 2020	56,628	$ 1,549	$ 899,978	$ (1,106)	$ (709,520)	$ (39,986)	$ 150,915
Stock-based compensation	—	—	3,241	—	—	—	3,241
Exercise of stock options	591	15	4,494	—	—	—	4,509
Issuance of vested restricted stock units	233	6	(6)	—	—	—	—
Stock issued under employee stock purchase plans	691	17	4,695	—	—	—	4,712
Net loss	—	—	—	—	(4,212)	—	(4,212)
Other comprehensive income	—	—	—	3	—	—	3
Balance at June 27, 2020	58,143	$ 1,587	$ 912,402	$ (1,103)	$ (713,732)	$ (39,986)	$ 159,168

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Treasury Stock	Total Stockholders' Equity
	Shares	Amount					
Balance at March 30, 2019	54,164	$ 1,488	$ 879,475	$ (487)	$ (694,649)	$ (39,986)	$ 145,841
Stock-based compensation	—	—	2,569	—	—	—	2,569
Exercise of stock options	6	—	35	—	—	—	35
Issuance of vested restricted stock units, net of taxes withheld	334	8	(138)	—	—	—	(130)
Stock issued under employee stock purchase plans	939	24	4,135	—	—	—	4,159
Net loss	—	—	—	—	(5,045)	—	(5,045)
Other comprehensive loss	—	—	—	(223)	—	—	(223)
Balance at June 29, 2019	55,443	$ 1,520	$ 886,076	$ (710)	$ (699,694)	$ (39,986)	$ 147,206

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Treasury Stock	Total Stockholders' Equity
	Shares	Amount					
Balance at December 31, 2019	56,448	$ 1,545	$ 895,899	$ (854)	$ (702,576)	$ (39,986)	$ 154,028
Stock-based compensation	—	—	6,225	—	—	—	6,225
Exercise of stock options	748	19	5,589	—	—	—	5,608
Issuance of vested restricted stock units	280	7	(7)	—	—	—	—
Stock issued under employee stock purchase plans	667	16	4,696	—	—	—	4,712
Net loss	—	—	—	—	(11,156)	—	(11,156)
Other comprehensive loss	—	—	—	(249)	—	—	(249)
Balance at June 27, 2020	58,143	$ 1,587	$ 912,402	$ (1,103)	$ (713,732)	$ (39,986)	$ 159,168

	Common Stock		Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Treasury Stock	Total Stockholders' Equity
	Shares	Amount					
Balance at December 31, 2018	53,955	$ 1,482	$ 876,073	$ (753)	$ (684,882)	$ (39,986)	$ 151,934
Stock-based compensation	—	—	5,714	—	—	—	5,714
Exercise of stock options	55	2	324	—	—	—	326
Issuance of vested performance restricted stock units and restricted stock units, net of taxes withheld	501	13	(169)	—	—	—	(156)
Stock issued under employee stock purchase plans	932	23	4,134	—	—	—	4,157
Net loss	—	—	—	—	(14,812)	—	(14,812)
Other comprehensive income	—	—	—	43	—	—	43
Balance at June 29, 2019	55,443	$ 1,520	$ 886,076	$ (710)	$ (699,694)	$ (39,986)	$ 147,206

See accompanying notes to condensed consolidated financial statements.

CALIX, INC.

CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands, unaudited)

	Six Months Ended	
	June 27, 2020	June 29, 2019
Operating activities:		
Net loss	$ (11,156)	$ (14,812)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:		
Stock-based compensation	6,225	5,714
Depreciation and amortization	7,006	4,644
Asset retirements and write-downs	3,749	138
Changes in operating assets and liabilities:		
Accounts receivable, net	(12,082)	6,840
Inventory	3,494	4,791
Prepaid expenses and other assets	1,175	1,697
Accounts payable	(671)	(2,676)
Accrued liabilities	7,868	(10,314)
Deferred revenue	(947)	3,223
Other long-term liabilities	(726)	(2,496)
Net cash provided by (used in) operating activities	3,935	(3,251)
Investing activity –		
Purchases of property and equipment	(4,480)	(9,538)
Financing activities:		
Proceeds from exercise of stock options	5,608	326
Proceeds from employee stock purchase plans	4,712	4,157
Taxes paid for awards vested under equity incentive plan	—	(156)
Payments related to financing arrangements	(1,529)	(1,267)
Proceeds from line of credit	30,000	89,000
Repayment of line of credit	(34,000)	(94,000)
Payments to originate the line of credit	(285)	—
Net cash provided by (used in) financing activities	4,506	(1,940)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(238)	25
Net increase (decrease) in cash, cash equivalents and restricted cash	3,723	(14,704)
Cash, cash equivalents and restricted cash at beginning of period	47,457	50,274
Cash, cash equivalents and restricted cash at end of period	$ 51,180	$ 35,570

See accompanying notes to condensed consolidated financial statements.

CALIX, INC.

NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

1. Company and Basis of Presentation

Company

Calix, Inc. (together with its subsidiaries, “Calix” or the “Company”) was incorporated in August 1999 and is a Delaware corporation. The Company is a leading global provider of cloud and software platforms, systems and services required to deliver the unified access network and smart home and business services of tomorrow. The Company’s platforms and services help its customers build next generation networks by embracing a DevOps operating model, optimizing the subscriber experience by leveraging big data analytics and turn the complexity of the smart home and business into new revenue streams. The Company's cloud and software platforms, systems and services enable communication service providers (“CSPs”) to provide a wide range of revenue-generating services, from basic voice and data to advanced broadband services, over legacy and next-generation access networks. The Company focuses on CSP access networks, the portion of the network that governs available bandwidth and determines the range and quality of services that can be offered to subscribers.

Basis of Presentation

The accompanying unaudited condensed consolidated financial statements, including the accounts of Calix, Inc. and its wholly-owned subsidiaries, have been prepared in accordance with the requirements of the U.S. Securities and Exchange Commission (“SEC”) for interim reporting. As permitted under those rules, certain footnotes or other financial information that are normally required by U.S. generally accepted accounting principles (“GAAP”) can be condensed or omitted. In the opinion of management, the financial statements include all normal and recurring adjustments that are considered necessary for the fair presentation of the Company’s financial position and operating results. All intercompany balances and transactions have been eliminated in consolidation. The Condensed Consolidated Balance Sheet at December 31, 2019 has been derived from the audited financial statements at that date.

The results of the Company’s operations can vary during each quarter of the year. Therefore, the results and trends in these interim financial statements may not be the same as those for the full year or any future periods. The information included in this Quarterly Report on Form 10-Q should be read in conjunction with the audited financial statements included in the Company’s Annual Report on Form 10-K for the year ended December 31, 2019.

The Company’s fiscal year begins on January 1st and ends on December 31st. Quarterly periods are based on a 4-4-5 calendar with the first, second and third quarters ending on the 13th Saturday of each fiscal period. As a result, the Company had one less day in the six months ended June 27, 2020 than for the six months ended June 29, 2019. The preparation of financial statements in conformity with GAAP for interim financial reporting requires management to make estimates and assumptions that affect the amounts reported in the condensed consolidated financial statements and accompanying notes. Actual results could differ from those estimates.

Risks and Uncertainties

The Company is subject to risks and uncertainties as a result of the recent COVID-19 pandemic. The extent of the impact of the COVID-19 pandemic on the Company's business is highly uncertain and difficult to predict. The Company has instituted office closures, travel restrictions and instituted a mandatory work-from-home policy for substantially all of its employees. The spread of COVID-19 has impacted the Company's supply chain operations through restrictions and shutdown of business activities by suppliers whom the Company relies on for sourcing components and materials and third-party partners whom the Company relies on for manufacturing, warehousing and logistics services. Although demand for the Company's products may remain strong in the short-term as subscribers seek more bandwidth and better WiFi, customers’ purchasing decisions over the long-term may be impacted by the pandemic and its impact on the economy, which could in turn impact the Company's revenue and results of operations. Furthermore, the Company’s supply chain continues to face challenges in sourcing components and materials to manufacture its products, and future outbreaks could cause further supply chain disruptions. As of the issuance date of these condensed consolidated financial statements, the extent to which the COVID-19 pandemic may materially impact the Company's financial condition, liquidity or results of operations is uncertain.

2. Significant Accounting Policies

The Company’s significant accounting policies are disclosed in its Annual Report on Form 10-K for the year ended December 31, 2019. The Company’s significant accounting policies did not change during the six months ended June 27, 2020.

Newly Adopted Accounting Standard

The Company did not adopt any new accounting standards during the six months ended June 27, 2020 that were significant to the Company.

Recent Accounting Pronouncements Not Yet Adopted

There have been no additional accounting pronouncements or changes in accounting pronouncements during the six months ended June 27, 2020, as compared to the recent accounting pronouncements described in the Company's Annual Report on Form 10-K for the year ended December 31, 2019, that are significant or potentially significant to the Company.

3. Cash, Cash Equivalents and Restricted Cash

Cash, cash equivalents and restricted cash consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Cash and cash equivalents:		
Cash	$ 50,552	$ 46,815
Money market funds	—	14
Total cash and cash equivalents	50,552	46,829
Restricted cash	628	628
	$ 51,180	$ 47,457

The carrying amounts of the Company’s money market funds approximate their fair values due to their nature, duration and short maturities.

4. Balance Sheet Details

Accounts receivable, net consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Accounts receivable	$ 60,020	$ 46,883
Allowance for doubtful accounts	(1,430)	(374)
	$ 58,590	$ 46,509

Inventory consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Raw materials	$ 383	$ 656
Finished goods	36,276	39,497
	$ 36,659	$ 40,153

Property and equipment, net consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Test equipment	$ 38,993	$ 37,001
Software	17,548	20,646
Computer equipment	11,229	10,835
Furniture and fixtures	2,197	2,342
Leasehold improvements	1,428	2,047
Total	71,395	72,871
Accumulated depreciation and amortization	(50,429)	(51,344)
	$ 20,966	$ 21,527

Other long-term assets consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Intangible asset	$ 10,833	$ 12,148
Capitalized cloud implementation costs	2,895	6,089
Other long-term assets	1,297	1,203
	$ 15,025	$ 19,440

Intangible Asset

In March 2018, the Company entered into an agreement with a vendor to develop certain software product and related enhancements pursuant to which the Company may be obligated to make minimum revenue-share payments under the program of up to $15.8 million over the three years following availability for sale. The payments are based on a revenue-share rate applied to revenue from the developed-product and the corresponding hardware sales subject to a minimum and a maximum aggregate amount over the three-year sales period. The Company had its first sale in August 2019, and as a result, the Company capitalized an intangible asset with a value of $13.2 million in the third quarter of 2019. The intangible asset has an estimated five-year useful life and is being amortized using the greater of the ratio of current gross revenue for the products to the total of current and anticipated future gross revenue for the products or the straight-line method.

Capitalized Cloud Implementation Costs

In January 2020, the Company went live with its cloud-based enterprise resource planning (“ERP”) system. As a result the Company capitalized $7.5 million of implementation costs in both prepaid expenses and other current assets and other long-term assets in the Company's Condensed Consolidated Balance Sheet. This amount is being amortized over a period of 29 months, representing the remaining contractual term. The amortization expense for the three and six months ended June 27, 2020 was $0.8 million and $1.6 million, respectively.

Accrued liabilities consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Compensation and related benefits	$ 19,501	$ 19,010
Warranty and retrofit	7,732	7,294
Customer advances or rebates	6,948	7,252
Component inventory held by suppliers	5,723	1,925
Current portion of financing arrangements	5,296	4,044
Professional and consulting fees	4,921	4,996
Operating leases	2,718	2,663
Taxes payable	2,175	2,021
Restructuring charges	1,383	—
Operations	1,248	1,053
Product returns	1,229	919
Freight	1,054	808
Other	4,756	5,561
	$ 64,684	$ 57,546

Warranty and Retrofit

The Company provides a standard warranty for its hardware products. Hardware generally has a one- or five-year standard warranty from the date of shipment. Under certain circumstances, the Company also provides fixes on specifically identified performance failures for products that are outside of the standard warranty period and recognizes estimated costs related to retrofit activities upon identification of such product failures. The Company accrues for potential warranty and retrofit claims based on the Company's historical product failure rates and historical costs incurred in correcting product failures along with other relevant information related to any specifically identified product failures. The Company's warranty and retrofit accruals are based on estimates of losses that are probable based on information available. The adequacy of the accrual is reviewed on a periodic basis and adjusted, if necessary, based on additional information as it becomes available. Changes in the Company's warranty and retrofit accrual are as follows (in thousands):

	Three Months Ended		Six Months Ended	
	June 27, 2020	June 29, 2019	June 27, 2020	June 29, 2019
Balance at beginning of period	$ 7,430	$ 8,166	$ 7,294	$ 8,547
Provision for warranty and retrofit charged to cost of revenue	1,276	860	2,625	1,567
Utilization of reserve	(974)	(1,116)	(2,187)	(2,204)
Balance at end of period	$ 7,732	$ 7,910	$ 7,732	$ 7,910

Accrued Restructuring Charges

Responding to trends caused by the COVID-19 pandemic, the Company initiated a restructuring plan in June 2020 to accelerate the Company's all platform future and to align with a work-from-anywhere culture. The Company incurred restructuring charges of approximately $6.3 million, consisting of facilities-related charges and severance and other termination related benefits for the three and six months ended June 27, 2020.

As part of its work-from-anywhere culture, many of the Company's employees elected to work remotely on a permanent basis. In light of this shift, the Company evaluated its space needs and determined that a portion of the Company's leased office spaces in Richardson, Texas and San Jose, California would no longer be utilized. As a result, the right-of-use assets related to these leases were written down, resulting in a charge of $3.5 million for the three and six months ended June 27, 2020. In addition, the Company wrote off assets with net book value of $0.3 million and accrued common areas maintenance fees and property taxes related to the unused office space totaling $1.4 million for three and six months ended June 27, 2020.

The following table summarizes the activities pursuant to the above restructuring plan (in thousands):

	Facilities	Severance and Related Benefits	Total
Balance at March 28, 2020	$ —	$ —	$ —
Restructuring charges	5,112	1,174	6,286
Asset write-down	(3,747)	—	(3,747)
Cash payments	—	(65)	(65)
Balance at June 27, 2020	$ 1,365	$ 1,109	$ 2,474

5. Credit Agreements

Line of Credit

In January 2020, the Company terminated its loan and security agreement with Silicon Valley Bank and entered into a new loan and security agreement with Bank of America, N.A. ("BofA Loan Agreement"). The BofA Loan Agreement provides for a revolving facility up to a principal amount of $35.0 million, including a $10.0 million sublimit for letters of credit. The BofA Loan Agreement matures, and all outstanding amounts become due and payable, in January 2023. The BofA Loan Agreement is secured by substantially all of the Company's assets, including the Company's intellectual property. Effective July 1, 2020, loans under the credit facility will bear interest at a rate per annum equal to either LIBOR (customarily defined) plus an applicable margin between 1.5% to 2.0% or Prime Rate (customarily defined) plus an applicable margin between 0.5% to 1.0%, in each case largely based on a fixed charge coverage ratio measured at the end of each fiscal quarter. The availability of borrowings under the BofA Loan Agreement is subject to certain conditions and requirements, including among others, if at any time the Company's availability is less than $5.0 million, the Company must maintain a minimum fixed charge coverage ratio ("FCCR") of 1.0 to 1.0. As of June 27, 2020, the Company was in compliance with these requirements, had borrowings outstanding of $26.0 million, availability of $9.0 million and an FCCR of 4.1 to 1.0. The Company's interest rate on the line of credit was 4.5% as of June 27, 2020 and decreased to 3.75% on July 1, 2020.

Financing Arrangements

During 2018, the Company entered into financing arrangements to purchase lab and test equipment for approximately $5.1 million. Each agreement is to be paid over 36 months with a weighted average interest rate of 6.2%. As of June 27, 2020, there was $2.1 million outstanding under these financing arrangements, which is included in accrued liabilities and other long-term liabilities in the accompanying Condensed Consolidated Balance Sheet.

From 2017 to 2020, the Company entered into financing arrangements for consulting services of $5.5 million in connection with the Company's ERP implementation. The current amounts due under this agreement are to be paid over a weighted average term of 2.4 years with a weighted average interest rate of 6.3%. As of June 27, 2020, there was $1.9 million outstanding under these arrangements, which is included in accrued liabilities and other long-term liabilities in the accompanying Condensed Consolidated Balance Sheet.

6. Commitments and Contingencies

Lease Commitments

The Company leases office space under non-cancelable operating leases. Certain of the Company's operating leases contain renewal options and rent acceleration clauses. Future minimum payments under the non-cancelable operating leases consisted of the following as of June 27, 2020 (in thousands):

Period	Minimum Future Lease Payments
Remainder of 2020	$ 1,890
2021	3,604
2022	3,461
2023	3,578
2024	3,388
Thereafter	2,881
Total future minimum lease payments	18,802
Less imputed interest	(3,109)
	$ 15,693

Operating lease liability consisted of the following (in thousands):

	June 27, 2020
Accrued liabilities - current portion of operating leases	$ 2,718
Operating leases	12,975
	$ 15,693

The Company leases its headquarters office space in San Jose, California under a lease agreement that expires in December 2025. The future minimum lease payments under the lease are $12.9 million and are included in the table above.

The weighted average discount rate for the Company's operating leases as of June 27, 2020 was 7.0%. The weighted average remaining lease term as of June 27, 2020 was 4.6 years.

For the three and six months ended June 27, 2020, total rent expense of the Company was $1.1 million and $2.2 million, respectively. For the three and six months ended June 29, 2019, total rent expense of the Company was $1.3 million and $2.5 million, respectively. Cash paid within operating cash flows for operating leases was $1.7 million and $2.0 million for six months ended June 27, 2020 and June 29, 2019, respectively.

Purchase Commitments

The Company's contract manufacturers ("CMs") and original design manufacturers ("ODMs") place orders for certain component inventory in advance based upon the Company's build forecasts in order to reduce manufacturing lead times and ensure adequate component supply. The components are used by the CMs and ODMs to build the products included in the build forecasts. The Company generally does not take ownership of the components held by CMs and ODMs. The Company places purchase orders with its CMs and ODMs in order to fulfill its monthly finished product inventory requirements. The Company incurs a liability when the CMs and ODMs convert the component inventory to a finished product and takes ownership of the finished goods inventory. In the event of termination of services with a manufacturing partner, the Company has purchased, and may be required to purchase in the future, certain of the remaining components inventory held by the CM or ODM as well as any outstanding orders pursuant to the contractual provisions with such CM or ODM. As of June 27, 2020, the Company had approximately $104.8 million of outstanding purchase commitments for inventories to be delivered by its suppliers, including CMs and ODMs, within one year.

The Company has from time to time, and subject to certain conditions, reimbursed certain suppliers for component inventory purchases when this inventory has been rendered excess or obsolete, for example due to manufacturing and engineering change orders resulting from design changes, manufacturing discontinuation of products by its suppliers, or in cases where the Company has committed inventory levels that greatly exceed projected demand. The estimated excess and obsolete inventory liabilities related to such manufacturing and engineering change orders and other factors, which are included in accrued liabilities in the accompanying balance sheets, were $5.7 million and $1.9 million as of June 27, 2020 and December 31, 2019, respectively. The Company records the related charges in cost of systems revenue in its Condensed Consolidated Statements of Comprehensive Loss.

Litigation

From time to time, the Company is involved in various legal proceedings arising from the normal course of business activities. The Company is not currently a party to any legal proceedings that, if determined adversely to the Company, in management’s opinion, are currently expected to individually or in the aggregate have a material adverse effect on the Company’s business, operating results or financial condition taken as a whole.

7. Stockholders’ Equity

2019 Equity Incentive Award Plan

At the Company’s 2019 annual meeting of stockholders, the stockholders approved the 2019 Equity Incentive Award Plan (the “2019 Plan”). The 2019 Plan supersedes and replaces the 2010 Equity Incentive Award Plan (the “2010 Plan”) and preceding plans. No further awards will be granted under the 2010 Plan; however, the terms and conditions of the 2010 Plan will continue to govern any outstanding awards granted under the 2010 Plan.

Employees and consultants of the Company, its subsidiaries and affiliates, as well as members of the Company's Board of Directors, are eligible to receive awards under the 2019 Plan. The 2019 Plan provides for the grant of stock options, including incentive stock options and nonqualified stock options, stock appreciation rights, restricted stock, restricted stock units (“RSUs”), other stock or cash-based awards and dividend equivalents to eligible individuals.

The number of shares available for issuance under the 2019 Plan includes an initial reserve of 1.7 million shares of common stock, any shares of common stock that are available for issuance under the 2010 Plan as of the effective date of the 2019 Plan and any shares of common stock subject to issued and outstanding awards under the 2010 Plan that expire, are cancelled or otherwise terminate following the effective date of the 2019 Plan. At the Company’s 2020 annual meeting of stockholders, the stockholders approved an increase in the number of shares of common stock issuable by 3.5 million shares. As of June 27, 2020, there were 5.0 million shares available for issuance under the 2019 Plan.

Stock Options

During the three months ended June 27, 2020, stock option awards exercisable for up to an aggregate of 0.9 million shares of common stock were granted with a grant date fair value of $12.63 per share. During the six months ended June 27, 2020, stock option awards exercisable for up to an aggregate of 0.9 million shares of common stock were granted with a grant date fair value of $12.44 per share.

During the three months ended March 28, 2020, performance-based stock option awards exercisable for up to an aggregate of 0.8 million shares of common stock were granted to certain Company executives with a grant date fair value of $9.16 per share. The actual number of shares earned is contingent upon achievement of annual corporate financial targets for bookings and non-GAAP net income for 2020 (collectively, the “2020 Performance Targets”) during the one-year performance period. These performance-based stock option awards will vest, subject to certification by the Compensation Committee of the Company’s Board of Directors upon the achievement of the 2020 Performance Targets, as to 25% of the shares of common stock earned on the date of such certification, and as to the remaining 75% of the shares of common stock earned, in substantially equal quarterly installments over the subsequent 36 months, subject to the executive’s continuous service with the Company through the respective vesting dates. Under the 2020 Performance Targets, if non-GAAP net income is below 80% of target and bookings are below 90% of target, no shares are awarded. From this base, shares are awarded on a 50% weighting for both non-GAAP net income and bookings up to 100% for each 2020 Performance Target using a sliding scale. The probability of meeting the performance conditions related to these performance-based stock option awards was assessed to be probable as of June 27, 2020, and stock-based compensation expense of $0.5 million was recognized for the three months ended June 27, 2020. For the six months ended June 27, 2020 stock-based compensation expense of $0.7 million was recognized.

During the three months ended March 30, 2019, performance-based stock option awards exercisable for up to an aggregate of 2.0 million shares of common stock were granted to Company executives with a grant date fair value of $8.03 per share. These performance-based stock option awards contained a one-year performance period and a subsequent three-year service period. The actual number of shares earned was contingent upon achievement of both annual and quarterly corporate financial targets for revenue, non-GAAP gross margin and non-GAAP net income per share for 2019 (collectively, the “2019 Performance Targets”) during the one-year performance period. In February 2020, following the review of the Company’s financial performance for 2019, the Compensation Committee of the Company’s Board of Directors certified that the 2019 Performance Targets (as modified) for the 2019 performance-based stock options were partially met, resulting in an award to each Company executive of 30% of their target shares. One quarter of these performance-based stock option awards vested on this date, and the remaining 75% of the shares of common stock earned will vest in substantially equal quarterly installments over the subsequent 36 months, subject to the executive’s continuous service with the Company through the respective vesting dates.

During the three months ended June 27, 2020, 0.6 million shares of common stock were issued pursuant to the exercise of stock options at a weighted-average exercise price of $7.63 per share. During the six months ended June 27, 2020, 0.7 million shares of common stock were issued pursuant to the exercise of stock options at a weighted-average exercise price of $7.50 per share. As of June 27, 2020, unrecognized stock-based compensation expense of $11.4 million related to stock options, net of estimated forfeitures, is expected to be recognized over a weighted-average period of 3.0 years.

Restricted Stock Units

During the three and six months ended June 27, 2020, RSUs of 0.1 million were granted with a grant date fair value of $11.22 per share. During the three months ended June 27, 2020, RSUs for 0.2 million shares of common stock vested. During the six months ended June 27, 2020, RSUs for 0.3 million shares of common stock vested. As of June 27, 2020, unrecognized stock-based compensation expense of $1.4 million related to RSUs, net of estimated forfeitures, was expected to be recognized over a weighted-average period of 0.8 years.

Employee Stock Purchase Plans

The Company maintains two employee stock purchase plans - the Amended and Restated Employee Stock Purchase Plan (the “ESPP”) and the Amended and Restated 2017 Nonqualified Employee Stock Purchase Plan (the “NQ ESPP”).

The ESPP allows eligible employees to purchase shares of the Company’s common stock through payroll deductions of up to 15% of their annual compensation subject to certain Internal Revenue Code limitations. In addition, no participant may purchase more than 2,000 shares of common stock in each offering period.

Beginning in the third quarter of 2020, the ESPP will provide two six-month offering periods from August 15th through February 14th and February 15th through August 14th of each year. A transition period began on May 15th and will end on August 14, 2020. The price of common stock purchased under the ESPP is 85% of the lower of the fair market value of the common stock on the commencement date and the end date of each six-month offering period. In May 2019, the stockholders approved an increase in the number of shares of common stock issuable under the ESPP by 2.5 million shares. The total shares authorized for issuance under the ESPP increased from 7.3 million shares to 9.8 million shares. As of June 27, 2020, there were 2.8 million shares available for issuance under the ESPP. During the three and six months ended June 27, 2020, 0.4 million shares were purchased under the ESPP. As of June 27, 2020, unrecognized stock-based compensation expense of $0.3 million related to the ESPP is expected to be recognized over a remaining service period of 0.1 years.

The NQ ESPP allows eligible employees to purchase shares of the Company’s common stock through payroll deductions of up to 25% of their annual compensation. Eligible employees have the right to (a) purchase the maximum number of whole shares of common stock that can be purchased with the elected payroll deductions during each offering period for which the employee is enrolled at a purchase price equal to the closing price of the Company’s common stock on the last day of such offering period and (b) receive an equal number of shares of the Company’s common stock that are subject to a risk of forfeiture in the event the employee terminates employment within the one year period immediately following the purchase date. Beginning in the fourth quarter of 2020, the NQ ESPP will provide two six-month offering periods, from November 15th through May 14th and May 15th through November 14th of each year. A transition period began on June 21st and will end on November 14, 2020. In May 2020, the stockholders approved an amendment of certain terms and an increase in the number of shares of common stock issuable under the NQ ESPP by 1.2 million shares. The maximum number of shares of common stock currently authorized for issuance under the NQ ESPP is 4.7 million shares, with a maximum of 0.5 million shares allocated per purchase period. As of June 27, 2020, there were 2.5 million shares available for issuance under the NQ ESPP, including the stockholder-approved 1.2 million share increase. During the three and six months ended June 27, 2020, 0.3 million shares were purchased and issued.

As of June 27, 2020, unrecognized stock-based compensation expense of $3.8 million related to the NQ ESPP is expected to be recognized over a remaining weighted-average service period of 1.1 years.

Stock-Based Compensation

The following table summarizes stock-based compensation expense (in thousands):

	Three Months Ended		Six Months Ended	
	June 27, 2020	June 29, 2019	June 27, 2020	June 29, 2019
Cost of revenue:				
Products	$ 126	$ 123	$ 233	$ 278
Services	90	93	205	192
Research and development	1,098	873	2,107	1,889
Sales and marketing	1,002	814	1,958	1,888
General and administrative	926	666	1,722	1,467
	$ 3,242	$ 2,569	$ 6,225	$ 5,714

8. Revenue from Contracts with Customers

The Company derives revenue from contracts with customers primarily from the following and categorizes its revenue as follows:

- Systems include revenue from the sale of access and premises systems, software platform licenses and cloud-based software subscriptions; and
- Services include revenue from professional services, customer support, software- and cloud-based maintenance, extended warranty subscriptions, training and managed services.

The following is a summary of revenue disaggregated by geographic region based upon the location of the customers (in thousands):

	Three Months Ended		Nine Months Ended	
	June 27, 2020	June 29, 2019	June 27, 2020	June 29, 2019
United States	$ 108,198	$ 85,837	$ 196,248	$ 161,622
Canada	2,868	3,317	6,989	6,732
Middle East	2,330	5,949	4,631	9,700
Caribbean	2,310	501	5,873	2,767
Europe	2,110	2,471	4,482	4,910
Other	1,207	2,229	2,482	3,923
	$ 119,023	$ 100,304	$ 220,705	$ 189,654

Contract Asset

The primary contract asset is revenue recognized on professional services contracts where the services are transferred to the customer over time, which has yet to be billed, and is classified within accounts receivable. Amounts are billed in accordance with the agreed-upon contractual terms. The balance at December 31, 2019 was $5.0 million of which $1.6 million remained in the Company's Condensed Consolidated Balance Sheet at June 27, 2020. The closing balance at June 27, 2020 was $4.0 million of which the Company expects to bill 52% of the balance during the remainder of 2020. The decrease in the contract asset was driven by billings for past services as well as the timing and volume of professional services contracts during the six months ended June 27, 2020.

Contract Liability

Deferred revenue consisted of the following (in thousands):

	June 27, 2020	December 31, 2019
Current:		
Products and services	$ 12,587	$ 12,480
Extended warranty	3,772	4,678
	16,359	17,158
Long-term:		
Products and services	1,786	790
Extended warranty	16,406	17,550
	18,192	18,340
	$ 34,551	$ 35,498

The decrease in the deferred revenue balance for the three and six months ended June 27, 2020 is primarily driven by $7.4 million and $13.4 million of revenue recognized that was included in the deferred revenue balance at the beginning of each period, respectively, offset by cash payments received or due in advance of satisfying the Company's performance obligations.

Revenue allocated to remaining performance obligations represent contract revenue that has not yet been recognized for contracts greater than one year, which includes deferred revenue and amounts that will be invoiced and recognized as revenue in future periods. This amount was $62.3 million as of June 27, 2020, and the Company expects to recognize 45% of such revenue over the next 12 months and the remainder thereafter.

Contract Costs

The Company capitalizes certain sales commissions related primarily to extended warranty support for which the expected amortization period is greater than one year. As of June 27, 2020, the unamortized balance of deferred commissions was $0.7 million. For the three and six months ended June 27, 2020, the amount of amortization was less than $0.1 million, and there was no impairment loss in relation to the costs capitalized.

Concentration of Customer Risk

CenturyLink, Inc. represented 15% of total revenue for each of the three and six months ended June 27, 2020, and 17% and 15% for the three and six months ended June 29, 2019, respectively. No other customers accounted for more than 10% of the Company's total revenue for these periods.

CenturyLink, Inc. accounted for 19% of the Company's accounts receivable as of June 27, 2020 and 17% as of December 31, 2019.

9. Income Taxes

The following table presents the provision for income taxes from operations and the effective tax rates for the periods indicated (in thousands, except percentages):

	Three Months Ended		Six Months Ended	
	June 27, 2020	June 29, 2019	June 27, 2020	June 29, 2019
Provision for income taxes	$ 148	$ 95	$ 477	$ 250
Effective tax rate	(3.6)%	(1.9)%	(4.5)%	(1.7)%

The effective tax rate for the three months ended June 27, 2020 was determined using an estimated annual effective tax rate adjusted for discrete items, if any, that occurred during the respective periods.

Deferred tax assets are recognized if realization of such assets is more likely than not. The Company has established and continues to maintain a full valuation allowance against its net deferred tax assets, with the exception of certain foreign deferred tax assets, as the Company does not believe that realization of those assets is more likely than not.

The Company's effective tax rate may be subject to fluctuation during the year as new information is obtained, which may affect the assumptions used to estimate the annual effective tax rate, including factors such as the mix of forecasted pre-tax earnings in the various jurisdictions in which it operates, valuation allowances against deferred tax assets, the recognition or de-recognition of tax benefits related to uncertain tax positions and changes in or the interpretation of tax laws in jurisdictions where it conducts business.

10. Net Loss Per Common Share

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

	Three Months Ended		Six Months Ended	
	June 27, 2020	June 29, 2019	June 27, 2020	June 29, 2019
Numerator:				
Net loss	$ (4,212)	$ (5,045)	$ (11,156)	$ (14,812)
Denominator:				
Weighted-average common shares outstanding used to compute basic net loss per share	57,261	54,624	56,906	54,339
Basic and diluted net loss per common share	$ (0.07)	$ (0.09)	$ (0.20)	$ (0.27)
Potentially dilutive shares, weighted average	6,996	7,191	6,789	6,832

Potentially dilutive shares have been excluded from the computation of diluted net loss per common share when their effect is antidilutive. These antidilutive shares were primarily from stock options, restricted stock units and performance restricted stock units. For each of the periods presented where the Company reported a net loss, the effect of all potentially dilutive securities would be antidilutive, and as a result diluted net loss per common share is the same as basic net loss per common share.

ITEM 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

This report includes "forward-looking statements" within the meaning of Section 27A of the Securities Act and Section 21E of the Securities and Exchange Act of 1934, as amended. All statements other than statements of historical facts are "forward-looking statements" for purposes of these provisions, including any projections of earnings, revenue or other financial items, any statement of or concerning the following: the plans and objectives of management for future operations, proposed new products or licensing, product development, anticipated customer demand or capital expenditures, anticipated growth and trends in our business and industry, future economic and/or market conditions or performance and assumptions underlying any of the above. In some cases, forward-looking statements can be identified by the use of terminology such as "could," "may," "will," "would," "expects," "believes," "intends," "plans," "anticipates," "estimates," "projects," "predicts," "potential," or "continue" or the negative thereof or other comparable terminology. Readers are cautioned that these forward-looking statements are only predictions and are subject to risks, uncertainties and assumptions that are difficult to predict. Although we believe that the expectations reflected in the forward-looking statements contained herein are reasonable, there can be no assurance that such expectations or any of the forward-looking statements will prove to be correct, and actual results could differ materially from those projected or assumed in the forward-looking statements. Our future financial condition and results of operations, as well as any forward-looking statements, are subject to inherent risks and uncertainties, including those identified in the Risk Factors discussed in Part II, Item 1A, of this report on Form 10-Q, as well as in other sections of this report and in our Annual Report on Form 10-K for the year ended December 31, 2019. All forward-looking statements and reasons why results may differ included in this Quarterly Report on Form 10-Q are made as of the date hereof, and we assume no obligation to update these forward-looking statements or reasons why actual results might differ.

Overview

We are a leading global provider of cloud and software platforms, systems and services for fiber- and copper-based network architectures and a pioneer in software defined access and cloud products focused on access networks and the subscriber. Our portfolio allows for a broad range of subscriber services to be provisioned and delivered over a single unified network. Our access systems can deliver voice and data services, advanced broadband services, mobile broadband, as well as high-definition video and online gaming. Our most recent generation of premises systems enable CSPs to address the complexity of the smart home and business and offer new services to their device enabled subscribers. We have designed all of our current platforms and related systems so that they can be monitored, analyzed, managed and supported by Calix Cloud.

We market our cloud and software platforms, systems and services to CSPs globally through our direct sales force as well as select resellers. Our customers range from smaller, regional CSPs to some of the world's largest CSPs. We have enabled approximately 1,600 customers to deploy passive optical, Active Ethernet and point-to-point Ethernet fiber access networks.

Beginning in 2018, the United States enacted a series of tariffs on certain goods manufactured in China. As a result of these tariffs, we incurred U.S. tariff and tariff-related costs of $6.2 million in 2019 and $1.7 million the first six months of 2020. In order to mitigate the impact of the tariffs enacted by the United States, we undertook a broad plan to realign our global supply chain by moving substantially all of our production outside of China in addition to other supply chain improvements in the first half of 2019. As a result of the tariffs imposed on a broader list of products in September 2019, we expanded the scope of our global supply chain realignment plan, which is expected to take until the end of 2020 to complete.

Our revenue and potential revenue growth will depend on our ability to sell and license our cloud and software platforms, systems and services to strategically aligned customers, including from market segments such as cable MSOs, WISPs, fiber overbuilders, municipalities and electric cooperatives, in the United States and internationally.

Revenue fluctuations result from many factors, including, but not limited to: increases or decreases in customer orders for our products and services, market, financial or other factors that may delay or materially impact customer purchasing decisions including as a result of uncertainty related to the COVID-19 pandemic, non-availability of products due to supply chain challenges including business closures, manufacturing disruptions and component shortages due to the COVID-19 pandemic, contractual terms with customers that result in delayed revenue recognition and varying budget cycles and seasonal buying patterns of our customers. More specifically, our customers tend to spend less in the first quarter as they are finalizing their annual budgets, and in certain regions, customers are challenged by winter weather conditions that inhibit fiber deployment in outside infrastructure. Our revenue is also dependent upon our customers' timing of purchases, capital expenditure plans and decisions to upgrade their network or adopt new technologies, including adoption of our software and cloud platform solutions, as well as our ability to grow our customer base.

Cost of revenue is strongly correlated to revenue and tends to fluctuate due to all of the above factors that may cause revenue fluctuations. Factors that impacted our cost of revenue for the three and six months ended June 27, 2020, and that we expect will impact cost of revenue in future periods, also include: changes in the mix of products delivered, customer location and regional mix, changes in product warranty and incurrence of retrofit costs, changes in the cost of our inventory, including higher costs due to materials shortages including components, supply constraints or unfavorable changes in trade policies,

investments to support expansion of cloud and customer support offerings, tariffs and associated costs to mitigate the impact of tariffs, amortization of intangibles, asset write-offs, silicon support fees and inventory write-downs. In particular, recently we have seen increases in global freight charges following China's reopening of manufacturing. Cost of revenue also includes fixed expenses related to our internal operations, which could increase our cost of revenue as a percentage of revenue if there are declines in revenue.

Our gross profit and gross margin fluctuate based on timing of factors such as new product introductions or upgrades to existing products, changes in customer mix and changes in the mix of products demanded and sold (and any related write-downs of existing inventory) and have in the past been negatively impacted by increases in mix of revenue towards professional services, increases in mix of revenue from channel sales rather than direct sales or other unfavorable customer or product mix, shipment volumes and any related volume discounts, changes in our product and services costs, pricing decreases or discounts, customer rebates and incentive programs due to competitive pressure or materials shortages, supply constraints, investments to support expansion of cloud and customer support offerings, tariffs or unfavorable changes in trade policies.

Our operating expenses fluctuate based on the following factors among others: changes in headcount and personnel costs, which comprise a significant portion of our operating expenses; variable compensation due to fluctuations in shipment volumes or level of achievement against performance targets; timing of research and development expenses, including investments in innovative solutions and new customer segments, prototype builds and outsourced development resources; asset write-offs; investments in our business and information technology infrastructure; and fluctuations in stock-based compensation expenses due to timing of equity grants or other factors affecting vesting.

Our net loss was $11.2 million for the six months ended June 27, 2020 and $17.7 million for 2019. Since our inception we have incurred significant losses, and as of June 27, 2020, we had an accumulated deficit of $713.7 million. Further, as a result of factors contributing to the fluctuations described above among other factors, many of which are outside our control, our quarterly operating results fluctuate from period to period. Comparing our operating results on a period-to-period basis may not be meaningful, and you should not rely on our past results as an indication of our future performance.

COVID-19 Pandemic

We are subject to risks and uncertainties as a result of the COVID-19 pandemic. The extent of the impact of the COVID-19 pandemic on our business is highly uncertain and difficult to predict as coronavirus continues to spread around the world. There is still no vaccine, and treatments are limited. We have instituted office closures, travel restrictions and continue with a mandatory work-from-home policy for substantially all of our employees. The spread of COVID-19 has impacted our supply chain operations through restrictions, reduced capacity and shutdown of business activities by suppliers whom we rely on for sourcing components and materials and third-party partners whom we rely on for manufacturing, warehousing and logistics services. Although demand for our products has been strong in the short-term as subscribers seek more bandwidth and better WiFi, customers' purchasing decisions over the long-term may be impacted by the pandemic and its impact on the economy, which could in turn impact our revenue and results of operations. Furthermore, our supply chain continues to face constraints primarily due to challenges in sourcing components and materials to manufacture our products, and future outbreaks could exacerbate these constraints or cause further supply chain disruptions. The extent to which the COVID-19 pandemic may materially impact our financial condition, liquidity or results of operations is uncertain.

In the second quarter of 2020, we made the decision to embrace a work-from-anywhere model, with many of our employees electing to work remotely on a permanent basis. This operating mode reduces our physical facilities requirements, and consequently, we established a restructuring plan to align our business to a work-from-anywhere model and incurred facilities-related restructuring charges of $5.1 million. Furthermore, in the second quarter of 2020 we realigned our product portfolio to reduce and consolidate certain legacy product lines as customers accelerated their interest in our all-platform offerings. These actions resulted in a component inventory accrual of $1.8 million and severance-related charges of $1.2 million.

Critical Accounting Policies and Estimates

Our financial statements are prepared in accordance with U.S. GAAP. These accounting principles require us to make certain estimates and judgments that can affect the reported amounts of assets and liabilities as of the date of the financial statements, as well as the reported amounts of revenue and expenses during the periods presented. Management bases its estimates, assumptions and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances. To the extent there are material differences between these estimates and actual results, our financial statements may be affected. Our management evaluates its estimates, assumptions and judgments on an ongoing basis.

Our critical accounting policies and estimates, which are revenue recognition and inventory valuation, are described under "Critical Accounting Policies and Estimates" in "Management's Discussion and Analysis of Financial Condition and Results of Operations" included in our Annual Report on Form 10-K for the year ended December 31, 2019. For the six months ended June 27, 2020, there have been no significant changes in our critical accounting policies and estimates.

Recent Accounting Pronouncements

There have been no additional accounting pronouncements or changes in accounting pronouncements during the six months ended June 27, 2020, as compared to the recent accounting pronouncements described in our Annual Report on Form 10-K for the year ended December 31, 2019, that are significant or potentially significant to us.

Results of Operations

Comparison of the Three and Six Months Ended June 27, 2020 and June 29, 2019

Revenue

Our revenue is comprised of the following:

- Systems include revenue from the sale of access and premises systems, software platform licenses and cloud-based software subscriptions; and
- Services include revenue from professional services, customer support, software- and cloud-based maintenance, extended warranty subscriptions, training and managed services.

The following table sets forth our revenue (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Revenue:								
Systems	$ 110,841	$ 92,833	$ 18,008	19 %	$ 205,350	$ 175,193	$ 30,157	17 %
Services	8,182	7,471	711	10 %	15,355	14,461	894	6 %
	$ 119,023	$ 100,304	$ 18,719	19 %	$ 220,705	$ 189,654	$ 31,051	16 %
Percent of total revenue:								
Systems	93 %	93 %			93 %	92 %		
Services	7 %	7 %			7 %	8 %		
	100 %	100 %			100 %	100 %		

Our revenue increased by $18.7 million and $31.1 million for the three and six months ended June 27, 2020, respectively, as compared to the corresponding periods in 2019 due to higher systems revenue of $18.0 million and $30.2 million, respectively, and higher services revenue of $0.7 million and $0.9 million, respectively. The increase in systems revenue was primarily due to higher revenue from our small, regional customers and, to a lesser extent, our large-sized customers, as service providers accelerated some deployments to respond to demand for network capacity and relieve network capacity constraints. The increase in services revenue was due to continued ramp in our next generation service offerings was only partially offset by lower professional services related to CAF deployments.

For the three and six months ended June 27, 2020, revenue generated in the United States was $108.2 million and $196.2 million, or 91% and 89% of our total revenue, respectively, compared to $85.8 million and $161.6 million, or 86% and 85% of our total revenue, respectively, for the same period in 2019. International revenue was $10.8 million and $24.5 million, or 9% and 11% of our total revenue, respectively, for the three and six months ended June 27, 2020, as compared to $14.5 million and $28.0 million, or 14% and 15% of our total revenue, respectively, for the same period in 2019.

Only CenturyLink, Inc. accounted for more than 10% of the Company's total revenue, representing 15% for both the three and six months ended June 27, 2020, and 17% and 15% for the three and six months ended June 29, 2019, respectively.

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Cost of Revenue, Gross Profit and Gross Margin

The following table sets forth our cost of revenue (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Cost of revenue:								
Systems	$ 56,721	$ 49,561	$ 7,160	14 %	$ 107,429	$ 94,162	$ 13,267	14 %
Services	5,897	6,075	(178)	(3) %	11,247	12,481	(1,234)	(10) %
	$ 62,618	$ 55,636	$ 6,982	13 %	$ 118,676	$ 106,643	$ 12,033	11 %

Our cost of revenue increased by $7.0 million and $12.0 million for the three and six months ended June 27, 2020, respectively, as compared with the corresponding periods in 2019. The $7.2 million and $13.3 million increases in our systems cost of revenue were less than the increases in revenue compared with the corresponding periods in 2019, despite a charge of $1.8 million related to our reduction and consolidation of legacy product lines taken in the second quarter of 2020, and were partly due to favorable customer and product mix. The decrease in services cost of revenue was mainly due to reduced personnel costs for the three and six months ended June 27, 2020 compared with the corresponding period in 2019.

The following table sets forth our gross profit and gross margin (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Gross profit:								
Systems	$ 54,120	$ 43,272	$ 10,848	25 %	$ 97,921	$ 81,031	$ 16,890	21 %
Services	2,285	1,396	889	64 %	4,108	1,980	2,128	107 %
	$ 56,405	$ 44,668	$ 11,737	26 %	$ 102,029	$ 83,011	$ 19,018	23 %
Gross margin:								
Systems	48.8 %	46.6 %			47.7 %	46.3 %		
Services	27.9 %	18.7 %			26.8 %	13.7 %		
Overall	47.4 %	44.5 %			46.2 %	43.8 %		

Gross profit increased to $56.4 million and $102.0 million for the three and six months ended June 27, 2020, respectively, from $44.7 million and $83.0 million during the corresponding periods in 2019 primarily due to higher systems and services gross margin.

During the three and six months ended June 27, 2020, systems gross margin was negatively impacted by U.S. tariff and tariff-related costs of $0.7 million and $1.7 million, or 65 and 80 basis points, respectively, and intangible asset amortization of $0.7 million and $1.3 million, or 60 basis points for both periods, respectively. Excluding the impact of U.S. tariff and tariff-related costs and intangible assets amortization, systems gross margin was 50.1% and 49.1% for the three and six months ended June 27, 2020, respectively. During the three and six months ended June 29, 2019, systems gross margin was negatively impacted by U.S. tariff and tariff-related costs of $1.9 million and $4.0 million, or 200 and 230 basis points, respectively. There was no intangible asset amortization in the three and six months ended June 29, 2019. Excluding the impact of U.S. tariff and tariff-related costs, systems gross margin was 48.6% and 48.5% for the three and six months ended June 29, 2019, respectively. The increase in systems gross margin excluding U.S. tariff and tariff-related costs and intangible assets amortization for the three months ended June 27, 2020 compared the corresponding period in 2019, was mainly due to continued growth in our all-platform offerings along with favorable product and customer mix.

Services gross margin increased for the three months ended June 27, 2020 compared to the corresponding period in 2019 due to lower personnel costs as our service revenue mix shifts away from low gross margin deployment services to higher gross margin software maintenance and services aligned with our platform offerings.

Operating Expenses

Research and Development Expenses

The following table sets forth our research and development expenses (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Research and development	$ 20,921	$ 20,700	$ 221	1 %	$ 41,592	$ 40,030	$ 1,562	4 %
Percent of total revenue	18 %	21 %			19 %	21 %		

Research and development expenses for the three months ended June 27, 2020 increased by $0.2 million as compared with the corresponding period in 2019 mainly due to higher personnel expenses of $0.7 million, primarily related to incentive compensation expense, and higher stock-based compensation of $0.2 million. These increases were partially offset by decreases in depreciation and amortization expense of $0.3 million and lower travel expenses of $0.2 million.

Research and development expenses for the six months ended June 27, 2020 increased by $1.6 million as compared with the corresponding period in 2019 mainly due to higher personnel expenses of $1.8 million, primarily related to incentive compensation expense, higher outside services expenses of $0.8 million and higher stock-based compensation of $0.2 million. These increases were partially offset by decreases in depreciation and amortization expense of $0.4 million, lower equipment expenses of $0.3 million and lower travel expenses of $0.3 million.

Sales and Marketing Expenses

The following table sets forth our sales and marketing expenses (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Sales and marketing	$ 21,343	$ 19,734	$ 1,609	8 %	$ 41,967	$ 39,073	$ 2,894	7 %
Percent of total revenue	18 %	20 %			19 %	21 %		

Sales and marketing expenses for the three months ended June 27, 2020 increased by $1.6 million as compared with the corresponding period in 2019 primarily due to higher personnel expenses of $1.7 million, mainly related to higher sales incentive compensation expense and investments in sales headcount, higher marketing expenses of $0.8 million and higher stock-based compensation of $0.2 million. These increases were partially offset by a decrease in travel expenses of $1.4 million.

Sales and marketing expenses for the six months ended June 27, 2020 increased by $2.9 million as compared with the corresponding period in 2019 primarily due to higher personnel expenses of $2.7 million, mainly related to investments in sales headcount and higher sales incentive compensation expense, and higher marketing expenses of $1.4 million. These increases were partially offset by a decrease in travel expenses of $1.6 million.

General and Administrative Expenses

The following table sets forth our general and administrative expenses (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
General and administrative	$ 11,193	$ 9,165	$ 2,028	22 %	$ 21,862	$ 17,952	$ 3,910	22 %
Percent of total revenue	9 %	9 %			10 %	9 %		

General and administrative expenses for the three months ended June 27, 2020 increased by $2.0 million as compared with the corresponding period in 2019 mainly due to capitalized cloud-computing amortization and subscription expenses of $1.1 million as our cloud-based ERP system went live in January of 2020, an increase in our bad debt allowance of $0.9 million, and an increase in personnel expenses of $0.4 million, primarily related to incentive compensation expense. These increases were partially offset by decreases in professional services fees of $0.4 million and facilities expenses of $0.2 million.

General and administrative expenses for the six months ended June 27, 2020 increased by $3.9 million as compared with the corresponding period in 2019 mainly due to capitalized cloud-computing amortization and subscription expenses of $2.2 million as our cloud-based ERP system went live in January of 2020, an increase in personnel expenses of $1.7 million, primarily related to the capitalization of internal resources related to our cloud-based ERP implementation that lowered personnel expenses in 2019 as well as an increase in incentive compensation expense in 2020, and an increase in our bad debt allowance of $1.0 million. These increases were partially offset by lower facilities expenses of $0.4 million and lower professional services fees of $0.3 million.

Restructuring Charges

The following table sets forth our restructuring charges (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Restructuring charges	$ 6,286	$ —	$ 6,286	100 %	$ 6,286	$ —	$ 6,286	100 %
Percent of total revenue	5 %	— %			3 %	— %		

Responding to changes and trends caused by the COVID-19 pandemic, we initiated a restructuring plan in June 2020 to accelerate our all-platform future and to align with a work-from-anywhere culture. We incurred restructuring charges of $6.3 million, consisting of facilities-related charges and severance and other termination related benefits. See Note 5, "*Balance Sheet Details*" of the Notes to Condensed Consolidated Financial Statements included in Part I, Item 1 of this Quarterly Report on Form 10-Q for further details.

Provision for Income Taxes

The following table sets forth our provision for income taxes (dollars in thousands):

	Three Months Ended				Six Months Ended			
	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent	June 27, 2020	June 29, 2019	Variance in Dollars	Variance in Percent
Provision for income taxes	$ 148	$ 95	$ 53	56 %	$ 477	$ 250	$ 227	91 %
Effective tax rate	(3.6)%	(1.9)%			(4.5)%	(1.7)%		

The effective tax rate for the three and six months ended June 27, 2020 was determined using an estimated annual effective tax rate adjusted for discrete items, if any, that occurred during the respective periods.

Deferred tax assets are recognized if realization of such assets is more likely than not. We have established and continue to maintain a full valuation allowance against our net deferred tax assets, with the exception of certain foreign deferred tax assets, as we do not believe that realization of those assets is more likely than not.

Our effective tax rate may be subject to fluctuation during the year as new information is obtained, which may affect the assumptions used to estimate the annual effective tax rate, including factors such as the mix of forecasted pre-tax earnings in the various jurisdictions in which we operate, valuation allowances against deferred tax assets, the recognition or de-recognition of tax benefits related to uncertain tax positions and changes in or the interpretation of tax laws in jurisdictions where we conduct business.

Liquidity and Capital Resources

We have funded our operations and investing activities primarily through cash generated from operations, borrowings on our line of credit, financing arrangements for certain lab equipment and consulting services and sales of our common stock. As of June 27, 2020, we had cash and cash equivalents of $50.6 million, which consisted of deposits held at banks held at major financial institutions.

Operating Activities

Net cash provided by operating activities was $3.9 million for the six months ended June 27, 2020 and consisted of $17.0 million of non-cash charges and $1.9 million of cash flow decreases reflected in the net change in assets and liabilities, partially offset by a net loss of $11.2 million. Cash flow decreases resulting from the net change in assets and liabilities primarily consisted of an increase in accounts receivable of $12.1 million, due to product shipment timing. In addition, there was a decrease in deferred revenue of $0.9 million due to the invoice timing of our customer support and subscription offerings and a decrease in accounts payable of $0.7 million, primarily due to timing of payments to our suppliers. These changes were partially offset by an increase in accrued liabilities of $7.9 million, due to an increase in accruals related to our restructuring activities and an increase our liability for components at certain suppliers. In addition, there was a decrease in inventory of $3.5 million due to lower deliveries as a result of the supply disruption during 2020 and an increase in prepaid expenses and other assets of $1.2 million, due to an increase in our VAT receivable and employee receivables related to income tax obligations associated with our NQ ESPP.

Non-cash charges primarily consisted of depreciation and amortization of $7.0 million, stock-based compensation of $6.2 million and lease restructuring charges of $3.7 million.

During the six months ended June 29, 2019, net cash used in operating activities was $3.3 million and consisted of a net loss of $14.8 million partially offset by $1.0 million of cash flow increases reflected in the net change in assets and liabilities and by $10.4 million of non-cash charges. Cash flow increases resulting from the net change in assets and liabilities primarily consisted of a decrease in accounts receivable of $6.8 million, mainly due to lower sales, a decrease in inventory of $4.8 million, primarily due to the transfer of raw material inventory to our new CM and higher excess and obsolete reserves, an increase in deferred revenue of $3.2 million due to increased support contracts, software maintenance and Calix Cloud subscriptions and a decrease in prepaid expenses and other assets of $1.7 million, mainly due to operating lease asset amortization. This was partially offset by a decrease in accrued liabilities of $10.3 million, mainly related to incentive compensation payments to employees and ESPP purchases, a decrease in accounts payable of $2.7 million, primarily due to less inventory purchases, a decrease in other long-term liabilities of $2.5 million, mainly due to operating lease liability amortization.

Non-cash charges primarily consisted of stock-based compensation of $5.7 million and depreciation and amortization of $4.6 million.

Investing Activity

For the six months ended June 27, 2020 we invested $4.5 million in capital expenditures consisting primarily of purchases of test equipment and computer equipment. Similarly, for the six months ended June 29, 2019, we invested $9.5 million in capital expenditures consisting primarily of purchases of test equipment, computer equipment and software.

Financing Activities

Net cash provided by financing activities of $4.5 million for the six months ended June 27, 2020 mainly consisted of proceeds from the issuance of common stock from stock option exercises of $5.6 million and from our employee stock purchase plans of $4.7 million. These inflows were partially offset by the partial re-payment of our line of credit of $4.0 million, payments related to financing arrangements of $1.5 million and payments to originate the credit line of $0.3 million.

Net cash used in financing activities of $1.9 million for the six months ended June 29, 2019 mainly related to reduced borrowing from the line of credit of $5.0 million and payments for financing arrangements of $1.3 million, partially offset by proceeds from the issuance of common stock under our employee stock purchase plans of $4.2 million and from stock option exercises of $0.3 million.

Working Capital and Capital Expenditure Needs

Our material cash commitments include non-cancelable firm purchase commitments, contractual obligations under our loan and security agreement with Bank of America, or BofA Loan Agreement, normal recurring trade payables, compensation-related and expense accruals, operating leases, minimum revenue-share obligations and obligations from financing arrangements. We believe that our outsourced approach to manufacturing provides us significant flexibility in both managing inventory levels and financing our inventory. In the event that our revenue plan does not meet our expectations, we may be required to curtail or eliminate expenditures to mitigate the impact on our working capital.

In January 2020, we terminated our Silicon Valley Bank loan and security agreement and entered into a new loan and security agreement with Bank of America, N.A. The BofA Loan Agreement provides for a revolving facility up to a principal amount of up to $35.0 million, including a $10.0 million sublimit for letters of credit. The BofA Loan Agreement matures, and all outstanding amounts become due and payable, in January 2023. The BofA Loan Agreement is secured by substantially all of our assets, including our intellectual property. Effective July 1, 2020, loans under the credit facility will bear interest at a rate per annum equal to either LIBOR (customarily defined) plus an applicable margin between 1.5% to 2.0% or Prime Rate (customarily defined) plus an applicable margin between 0.5% to 1.0%, in each case largely based on a fixed charge coverage ratio measured at the end of each fiscal quarter. The availability of borrowings under the BofA Loan Agreement is subject to certain conditions and requirements, including among others, if at any time our availability is less than $5.0 million, we must maintain a minimum fixed charge coverage ratio, or FCCR, of 1.0 to 1.0. As of June 27, 2020, we were in compliance with these requirements, had borrowings outstanding of $26.0 million, availability of $9.0 million and an FCCR of 4.1 to 1.0. Our interest rate on the line of credit was 4.5% as of the quarter ended June 27, 2020 and decreased to 3.75% on July 1, 2020.

In March 2018, we entered into an agreement with a vendor to develop software products pursuant to which we would become obligated, if the vendor delivered software that meets our technical requirements for commercial sale, to make minimum revenue-share payments of $15.8 million over the subsequent three years. The payments are based on a revenue-share rate applied to revenue from developed product sales subject to a minimum and a maximum aggregate amount over the three-year sales period. We had our first sale in August 2019. Revenue-share payments are paid quarterly in arrears, and we began making payments in the first quarter of 2020.

During 2018, we entered into financing arrangements to purchase lab equipment for approximately $5.1 million. Each agreement is to be paid over 36 months with a weighted average interest rate of 6.2%. As of June 27, 2020, we had $2.1 million outstanding under these financing arrangements.

From 2017 to 2020, in connection with our ERP implementation, we entered into financing arrangements for consulting services of $5.5 million. The current amounts due under this agreement are to be paid over a weighted average term of 2.4 years with a weighted average interest rate of 6.2%. As of June 27, 2020, there was $1.9 million outstanding under this arrangement.

We believe, based on our current operating plan and expected operating cash flows, that our existing cash and cash equivalents, along with available borrowings under our BofA Loan Agreement, will be sufficient to meet our anticipated cash needs for at least the next twelve months. Our future capital requirements will depend on many factors including our rate of revenue growth; timing of customer payments and payment terms, particularly of larger customers; the timing and extent of spending to support development efforts; our ability to manage product cost, including the cost impact of the U.S. tariffs as well as the possibility of additional tariffs or costs associated with disruptions in global trade and relations that may impact our product costs and higher component costs associated with new technologies; the global impact of the COVID-19 pandemic, particularly if restrictions are prolonged; our ability to implement efficiencies and maintain product margin levels; the expansion of sales and marketing activities; the success of revenue share programs; the timing of introductions and timing and rate of customer adoption of new products and enhancements to existing products; the slowdowns or declines in customer purchases of traditional systems; acquisition of new capabilities or technologies; and the continued market acceptance of our products. If we are unable to execute on our current operating plan or generate positive operating income and positive cash flows, our liquidity, results of operations and financial condition will be adversely affected, and we may fail to meet the borrowing base requirements or comply with the covenants in the BofA Loan Agreement, in which case we may not be able to borrow under the BofA Loan Agreement. We may need to seek other sources of liquidity, including the sale of equity or incremental borrowings, to support our working capital needs. In addition, we may choose to seek other sources of liquidity even if we believe we have generated sufficient cash flows to support our operational needs. There is no assurance that any other sources of liquidity may be available to us on acceptable terms or at all. If we are unable to generate sufficient cash flows or obtain other sources of liquidity, we will be forced to limit our development activities, reduce our investment in growth initiatives and institute cost-cutting measures, all of which may adversely impact our business and potential growth.

Contractual Obligations and Commitments

Our principal commitments as of June 27, 2020 consisted of our contractual obligations under the BofA Loan Agreement, financing arrangements, operating leases for office space and non-cancelable outstanding purchase obligations. The following table summarizes our contractual obligations at June 27, 2020 (in thousands):

	Payments Due by Period				
	Total	Less Than 1 Year	1-3 Years	3-5 Years	More Than 5 Years
Non-cancelable purchase commitments (1)	$ 104,763	$ 104,763	$ —	$ —	$ —
Line of credit, including interest (2)	29,026	1,170	27,856	—	—
Financing arrangements (3)	19,977	5,450	14,527	—	—
Operating lease obligations (4)	18,802	3,720	6,971	6,774	1,337
	$ 172,568	$ 115,103	$ 49,354	$ 6,774	$ 1,337

(1) Represents outstanding purchase commitments for inventory to be delivered by our third-party manufacturers. See Note 6, "*Commitments and Contingencies*" of the Notes to Condensed Consolidated Financial Statements included in Part I, Item 1 of this Quarterly Report on Form 10-Q for further discussion regarding our outstanding purchase commitments.

(2) Line of credit contractual obligations include projected interest payments over the term of the BofA Loan Agreement, assuming the interest rate in effect for the outstanding borrowings as of June 27, 2020 of 4.5% and payment of the borrowings on January 27, 2023, the contractual maturity date of the credit facility. See Note 5, *"Credit Agreements"* of the Notes to Condensed Consolidated Financial Statements included in Part I, Item 1 of this Quarterly Report on Form 10-Q for further discussion regarding our contractual obligations relating to our line of credit.

(3) Represents installment payments, including interest, related to financing arrangements and estimated total minimum revenue-share obligations under the program, including imputed interest, of $15.8 million associated with developed software product and related enhancements by an engineering service provider of which approximately $12.8 million has been incurred. The schedule reflects our expected revenue-share payments based on our revenue projections for the developed products over a three-year sales period. If the minimum revenue-share payments are not achieved by the end of the three-year sales period, a true-up payment will be due.

(4) Future minimum operating lease obligations in the table above include primarily payments for our office locations, which expire at various dates through 2025. See Note 6 "*Commitments and Contingencies*" of the Notes to Condensed Consolidated Financial Statements included in Part I, Item 1 of this Quarterly Report on Form 10-Q for further discussion regarding our operating leases.

Off-Balance Sheet Arrangements

As of June 27, 2020 and December 31, 2019, we did not have any off-balance sheet arrangements.

ITEM 3. Quantitative and Qualitative Disclosures About Market Risk

Interest Rate Risk

The primary objectives of our investment activity are to preserve principal, provide liquidity and maximize income without significantly increasing risk. By policy, we do not enter into investments for trading or speculative purposes. At June 27, 2020, we had cash of $50.6 million, which is not exposed to interest rate risk.

Our exposure to interest rate risk also relates to the amount of interest we must pay on our borrowings under our Loan Agreement with BofA. Borrowings under the BofA Loan Agreement will bear interest through maturity at a variable annual rate based upon an annual rate of either a prime rate or a LIBOR rate, plus an applicable margin between 0.5% to 1.0% for prime rate advances and between 1.5% and 2.0% for LIBOR advances based on our FCCR. As of June 27, 2020, we had $26.0 million outstanding in borrowings under the BofA Loan Agreement.

Foreign Currency Exchange Risk

Our primary foreign currency exposures are described below.

Economic Exposure

The direct effect of foreign currency fluctuations on our sales and expenses has not been material because our sales and expenses are primarily denominated in U.S. dollars, or USD. However, we are indirectly exposed to changes in foreign currency exchange rates to the extent of our use of foreign CMs whom we pay in USD. Increases in the local currency rates of these vendors in relation to USD could cause an increase in the price of products that we purchase. Additionally, if the USD strengthens relative to other currencies, such strengthening could have an indirect effect on our sales to the extent it raises the cost of our products to non-U.S. customers and thereby reduces demand. A weaker USD could have the opposite effect. The precise indirect effect of currency fluctuations is difficult to measure or predict because our sales are influenced by many factors in addition to the impact of such currency fluctuations.

Translation Exposure

Our sales contracts are primarily denominated in USD and, therefore, the majority of our revenue is not subject to foreign currency risk. We are directly exposed to changes in foreign exchange rates to the extent such changes affect our expenses related to our foreign assets and liabilities with our subsidiaries in China and the United Kingdom, whose functional currencies are Chinese Renminbi, or RMB, and British Pounds Sterling, or GBP.

Our operating expenses are incurred primarily in the United States, in China associated with our research and development operations that are maintained there and in the United Kingdom for our international sales and marketing activities. Our operating expenses are generally denominated in the functional currencies of our subsidiaries in which the operations are located. The percentages of our operating expenses denominated in the following currencies for the indicated periods were as follows:

	Six Months Ended	
	June 27, 2020	June 29, 2019
USD	92 %	90 %
RMB	5 %	7 %
GBP	3 %	3 %
	100 %	100 %

If USD had appreciated or depreciated by 10%, relative to RMB and GBP, our operating expenses for the first six months of 2020 would have decreased or increased by approximately $0.9 million, or approximately 1%. We do not currently enter into forward exchange contracts to hedge exposure denominated in foreign currencies or any derivative financial instruments. In the future, we may consider entering into hedging transactions to help mitigate our foreign currency exchange risk.

Foreign exchange rate fluctuations may also adversely impact our financial position as the assets and liabilities of our foreign operations are translated into USD in preparing our Condensed Consolidated Balance Sheets. The effect of foreign exchange rate fluctuations on our consolidated financial position for the six months ended June 27, 2020 was a net translation gain of $0.2 million. This gain is recognized as an adjustment to stockholders' equity through accumulated other comprehensive loss.

Transaction Exposure

We have certain assets and liabilities, primarily receivables and accounts payable (including inter-company transactions) that are denominated in currencies other than the relevant entity's functional currency. In certain circumstances, changes in the

functional currency value of these assets and liabilities create fluctuations in our reported consolidated financial position, cash flows and results of operations. Transaction gains and losses on these foreign currency denominated assets and liabilities are recognized each period within “Other expense, net” in our Condensed Consolidated Statements of Comprehensive Loss. During the six months ended June 27, 2020, the net gain we recognized related to these foreign exchange assets and liabilities was approximately $16,000.

ITEM 4. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Based on their evaluation as of June 27, 2020, our Chief Executive Officer and Chief Financial Officer, with the participation of our management, have concluded that our disclosure controls and procedures (as defined in Rules 13a–15(e) and 15d–15(e) under the Exchange Act) were effective at the reasonable assurance level.

Limitations on the Effectiveness of Controls

Our disclosure controls and procedures provide our Chief Executive Officer and Chief Financial Officer reasonable assurance that our disclosure controls and procedures will achieve their objectives. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, as appropriate, to allow timely decisions regarding required disclosure. Our management, including our Chief Executive Officer and Chief Financial Officer, does not expect that our disclosure controls and procedures or our internal control over financial reporting can or will prevent all human error. Our management recognizes that a control system, no matter how well designed and implemented, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Furthermore, the design of a control system must reflect the fact that there are internal resource constraints, and the benefit of controls must be weighed relative to their corresponding costs. Because of the limitations in all control systems, no evaluation of controls can provide complete assurance that all control issues and instances of error, if any, within our company are detected. These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur due to human error or mistake. Additionally, controls, no matter how well designed, could be circumvented by the individual acts of specific persons within the organization. The design of any system of controls is also based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated objectives under all potential future conditions.

Changes in Internal Control over Financial Reporting

There was no change in our internal control over financial reporting identified in connection with the evaluation required by Rule 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the period covered by this report that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. Legal Proceedings

For a description of our material pending legal proceedings, please refer to Note 6 *"Commitments and Contingencies – Litigation"* of the Notes to Condensed Consolidated Financial Statements included in Part I, Item 1 of this Quarterly Report on Form 10-Q, which is incorporated by reference.

ITEM 1A. Risk Factors

We have identified the following additional risks and uncertainties that may affect our business, financial condition and/or results of operations. The risks described below include any material changes to and supersede the description of the risk factors disclosed in Part I, Item 1A of our Annual Report on Form 10-K for the year ended December 31, 2019, as filed with the Securities and Exchange Commission on February 21, 2020. Investors should carefully consider the risks described below, together with the other information set forth in this Quarterly Report on Form 10-Q, before making any investment decision. The risks described below are not the only ones we face. Additional risks not currently known to us or that we currently believe are immaterial may also significantly impair our business operations. Our business could be harmed by any of these risks. The trading price of our common stock could decline due to any of these risks, and investors may lose all or part of their investment.

Risks Related to Our Business and Industry

Our business and results of operations may be negatively affected by the COVID-19 pandemic that has severely impacted the global economy.

In late 2019 a novel strain of coronavirus, identified as COVID-19, was reported in Wuhan, China. COVID-19 has since been declared a global pandemic by the World Health Organization and has severely impacted the global economy, disrupting financial markets, supply chains, customer spending and purchasing patterns and general business operations, and leading to higher than expected unemployment rates. In response, governments have implemented measures to attempt to contain and mitigate the transmission of COVID-19, including shelter in place orders, travel restrictions, mandatory quarantines and shutdown of certain non-essential business activities, all of which have resulted in global business disruptions as well as significant impacts on societal interactions. We cannot predict the continued impact of the pandemic and the degree to which our business and results of operations may be affected. There are no assurances that the global economy will recover quickly or at all, or that impacted areas will be able to fully contain COVID-19 to avoid new waves of infections. The COVID-19 pandemic has also presented financial challenges to numerous businesses, which may result in liquidity issues leading to heightened difficulties with collections.

In consideration of the health and safety of our employees, we instituted office closures, travel restrictions and a mandatory work from home policy for substantially all of our employees. In consideration of the well-being of our employees and customers, we replaced in-person meetings and conferences with virtual meetings and events and we are leveraging technology to host ConneXions, our annual user conference, virtually this fall. Furthermore, we have transitioned our workforce to a work-from-anywhere model, and are reorganizing our physical office requirements and embracing a virtual culture. While these measures help to contain and mitigate the transmission of COVID-19 and the impact on productivity, such measures are disruptive, require transition to new business processes and detract our employees from normal business activities.

The spread of COVID-19 has impacted our supply chain operations through restrictions and shutdown of business activities, suppliers from whom we rely on for sourcing components and materials and third-party partners from whom we rely on for manufacturing, warehousing and logistics services. Specifically, the manufacture of our products requires optical-electronic components, chipsets and materials with critical dependencies on manufacturing located in China. Business disruptions due to factory shutdowns and other containment measures have decreased productivity from these suppliers, resulting in competing demand and longer lead times for components and materials needed for the manufacture of our products. In addition, shortages of fiber optics and other materials may delay planned fiber network buildouts by CSPs, which in turn could delay or lower demand for our products. If these containment measures continue for a prolonged period, we may experience a sustained shortage of components and materials, which may have a material negative impact our ability to supply products to meet customer requirements and could materially adversely affect our business and results of operations.

Similarly, our customers' purchasing decisions may be impacted by the pandemic, which could in turn impact our sales and results of operations. For example, CSPs may choose not to invest at this time in our new platforms, or delay infrastructure improvements due to the uncertainty in the global economy. The COVID-19 pandemic has disrupted global markets, leading to significant unemployment rates and increasing uncertainty over fears of a global recession.

Adverse global economic conditions, geopolitical issues and other conditions that impact our increasingly global operations, including uncertainty around global trade policies and outbreaks of pandemic diseases, could have a negative effect on our business, results of operations and financial condition and liquidity.

As a global company, our performance is affected by global economic conditions as well as geopolitical issues and other conditions with global reach. In recent years concerns about the global economic outlook have adversely affected market and business conditions in general. Macroeconomic weakness and uncertainty also make it more difficult for us to accurately forecast revenue, gross margin and expenses. Geopolitical issues, such as ongoing conflicts between the United States and China related to tariffs, trade policy changes, other international trade policy changes and the withdrawal of the United Kingdom from the European Union, as well as political positioning by each country, have resulted in increasing global tensions and create uncertainty for global commerce. In particular, we incurred substantial costs and diversion of resources in realigning our supply chain operations to move substantially all of our product manufacturing to locations outside of China as a result of these tariff and trade policy changes. More recently, the uncertainty over the global COVID-19 pandemic, which has resulted in government-imposed travel restrictions across a number of countries and closures of numerous business operations globally, has disrupted and delayed our and our global supply chain operations. Sustained uncertainty about, or worsening of, global economic conditions, geopolitical issues and other conditions with global impact may increase our cost of doing business or disrupt our supply chain operations and may cause our customers to reduce or delay spending and could intensify pricing pressures. Any or all of these factors could negatively affect demand for our products and our business, financial condition and result of operations.

We have a history of losses, and we may not be able to generate positive operating income and positive cash flows in the future.

We have experienced net losses in each year of our existence. We incurred net losses of $17.7 million in 2019, $19.3 million in 2018 and $83.0 million in 2017. For the first six months of 2020, we incurred a net loss of $11.2 million. As of June 27, 2020, we had an accumulated deficit of $713.7 million.

We expect to continue to incur significant expenses and cash outlays for research and development associated with our platforms and systems, including our cloud and services operations, investments in innovative technologies, expansion of our product portfolio, sales and marketing, customer support and general and administrative functions as we expand our business and operations and target new customer opportunities, including larger CSPs and cable MSOs as well as additional types of regional and local providers. Given our anticipated growth and the intense competitive pressures we face, we may be unable to adequately control our operating costs or generate positive operating income.

We cannot guarantee that we will achieve profitability in the future. We will have to generate and sustain significant and consistent increased revenue, while continuing to control our expenses, in order to achieve and then maintain profitability. We may also incur significant losses in the future for a number of reasons, including the risks discussed in this “Risk Factors” section and other factors that we cannot anticipate. If we are unable to generate positive operating income and positive cash flows from operations, our liquidity, results of operations and financial condition will be adversely affected. If we are unable to generate cash flows to support our operational needs, we may need to seek other sources of liquidity, including additional borrowings, to support our working capital needs. In addition, we may choose to seek other sources of liquidity even if we believe we have generated sufficient cash flows to support our operational needs. There is no assurance that any other sources of liquidity may be available to us on acceptable terms or at all. If we are unable to generate sufficient cash flows or obtain other sources of liquidity, we will be forced to limit our development activities, reduce our investment in growth initiatives and institute cost-cutting measures, all of which would adversely impact our business and growth.

Our quarterly and annual operating results may fluctuate significantly, which may make it difficult to predict our future performance and could cause the market price of our stock to decline.

A number of factors, many of which are outside of our control, may cause or contribute to significant fluctuations in our quarterly and annual operating results. These fluctuations may make financial planning and forecasting difficult. Comparing our operating results on a period-to-period basis may not be meaningful, and you should not rely on our past results as an indication of our future performance. If our revenue or operating results fall below the expectations of investors or securities analysts, or below any guidance we may provide to the market, the market price of our stock would likely decline.

In addition to the other risk factors listed in this “Risk Factors” section, factors that have in the past and may continue to contribute to the variability of our operating results include:

- our ability to predict our revenue and reduce and control our costs;
- our ability to predict product functions and features desired by our customers;
- the impact of global economic conditions, including the impact of the COVID-19 pandemic;

- our ability to effectively manage our global supply chain operations to mitigate the impact of the COVID-19 pandemic and U.S. tariffs and other trade policies;
- our ability to manage our relationships with our third-party vendors, including CMs, ODMs, logistics providers, component suppliers and development partners;
- our ability to forecast our manufacturing and product supply requirements and manage our inventory;
- our dependence on sole-, single- and limited-source suppliers and supply chain partners, including suppliers located primarily or solely in China where there are a number of factors that could negatively impact our supply chain;
- the capital spending patterns of CSPs and any decrease or delay in capital spending by CSPs due to macro-economic conditions, regulatory uncertainties or other reasons;
- the impact of government-sponsored programs on our customers and the impact to our customers of U.S. federal government disruptions, such as government shutdowns, on such programs;
- intense competition, including market entrants whose products may be substitutes to ours;
- our ability to develop new products or enhancements that support technological advances and meet changing CSP requirements;
- our ability to ramp sales and achieve market acceptance of our new products and CSPs' willingness to adopt and deploy our new products;
- the concentration of our customer base as well as our dependence on a limited number of key customers;
- the length and unpredictability of our sales cycles and timing of orders;
- our lack of long-term, committed-volume purchase contracts with our customers;
- our ability to increase our sales globally and to increase our customer base;
- our exposure to the credit risks of our customers;
- fluctuations in our gross margin;
- the interoperability of our products with CSP networks;
- our products' compliance with industry standards and regulatory requirements that apply to our products and services;
- our ability to expand our international operations;
- our ability to protect our intellectual property and the cost of doing so;
- the quality of our products, including any undetected hardware defects or bugs in our software;
- our ability to manage data security risks as we grow our cloud and software portfolio;
- our ability to estimate future warranty and service obligations;
- our ability to obtain necessary third-party technology licenses at reasonable costs;
- the regulatory and physical impacts of climate change and other natural events;
- the attraction and retention of qualified employees and key management personnel; and
- our ability to maintain proper and effective internal controls.

Our gross margin may fluctuate over time, and our current level of gross margin may not be sustainable.

Our current level of gross margin may not be sustainable and may be adversely affected by numerous factors, including:

- changes in customer, geographic or product mix, including the mix of configurations within each product group;
- the pursuit or addition of new large customers;
- increased price competition, including the impact of customer discounts and rebates;
- our ability to effectively manage the transition of our global supply chain operations to mitigate the impact of U.S. tariffs;
- our ability to reduce and control product costs;

- an increase in revenue mix toward services, which typically have lower margins;
- changes in component pricing;
- changes in pricing with our third-party manufacturing partners;
- charges incurred due to inventory holding periods if parts ordering does not correctly anticipate product demand;
- introduction of new products and new technologies, which may involve higher component costs;
- our ability to scale our services business in order to gain desired efficiencies;
- changes in shipment volume;
- changes in or increased reliance on distribution channels;
- potential liabilities associated with increased reliance on third-party vendors;
- increased expansion efforts into new or emerging markets;
- increased warranty costs;
- excess and obsolete inventory and inventory holding charges;
- expediting costs incurred to meet customer delivery requirements; and
- potential costs associated with contractual obligations.

Our customer base is concentrated, and there are a limited number of potential customers for our products. The loss of any of our key customers, a decrease in purchases by our key customers, pricing pressures or our inability to grow our customer base would adversely impact our revenue and results of operations and any delays in payment by a key customer could negatively impact our cash flows and working capital.

Historically, a large portion of our sales has been to a limited number of customers. For example, CenturyLink, Inc. accounted for 15% of total revenue in 2019, 18% of total revenue in 2018 and 31% of total revenue in 2017. However, we cannot anticipate the same level of purchases in the future by these or other customers who have historically comprised a larger percentage of our revenue. Although these customers now comprise a smaller percentage of our revenue, we expect that changes in the CSP market, such as financial difficulties, spending cuts or corporate consolidations that impact purchasing decisions by these customers may continue to adversely impact our revenue, and as a result, revenue from such customers may remain flat or continue to decline. For example, CenturyLink completed a large acquisition at the end of 2017, which disrupted its historical levels of purchases with us and we have continued to experience significantly reduced levels of purchases by CenturyLink compared to historical levels. There is no assurance that purchasing levels by CenturyLink will increase from current levels or return to historical levels, and we expect continued uncertainty as it continues to complete its transition activities and corporate strategies. We have experienced and expect to continue to experience delays or declines in purchases by certain CSPs due to deterioration and weakness in their financial condition. For example, Windstream, another one of our larger customers, filed a voluntary petition for relief under Chapter 11 of the U.S. Bankruptcy Code in February 2019 after it was found in default of certain debt instruments. In April 2020, another customer, Frontier, filed a voluntary petition for relief under Chapter 11 of the U.S. Bankruptcy Code in order to facilitate a financial restructuring plan. Any decrease or delay in purchases and/or capital expenditure plans of any of our key customers, particularly if prolonged or sustained, or our inability to grow our sales with existing customers, may have a material negative impact on our revenue and results of operations.

We anticipate that a large portion of our revenue will continue to depend on sales to a limited number of customers. In addition, some larger customers may demand discounts and rebates or desire to purchase their access systems and software from multiple providers. As a result of these factors, our future revenue opportunities may be limited, and we may face pricing pressures, which in turn could adversely impact our margins and our profitability. The loss of, reduction in or pricing discounts associated with, orders from any key customer would significantly reduce our revenue and harm our business. Furthermore, delays in payment and/or extended payment terms from any of our key or larger customers could have a material negative impact on our cash flows and working capital to support our business operations.

Furthermore, over the years the CSP market has undergone substantial consolidation. Industry consolidation generally has negative implications for equipment suppliers, including a reduction in the number of potential customers, a decrease in aggregate capital spending and greater pricing leverage on the part of CSPs over equipment suppliers. Continued consolidation of the CSP industry and among independent local exchange carriers and IOC customers, who represent a large part of our business, could make it more difficult for us to grow our customer base, increase sales of our products and maintain adequate gross margin.

Our new products are early in their life cycles and subject to uncertain market demand. If our customers are unwilling to adopt our platforms, install our new products or deploy our new services, or we are unable to achieve market acceptance of our new products, our business and financial results will be harmed.

Our new products are early in their life cycles and subject to uncertain market demand. They also may face obstacles in manufacturing, deployment and competitive response. Adoption of our new products, such as our smart home and business systems, is dependent on the success of our customers in investing, deploying and selling advanced services to their subscribers, and our ability to differentiate our products from competing or substitutive product and service offerings. Our products support a variety of advanced broadband services, such as high-speed Internet, managed Wi-Fi, connected home, IPTV, mobile broadband, high-definition video and online gaming. If we are unable to ramp sales of our new products, or if subscriber demand for our services does not grow as expected or declines, or our customers are unable or unwilling to invest in our platforms to deploy and market these services, particularly in light of the COVID-19 pandemic, demand for our products may decrease or fail to grow at rates we anticipate.

If we fail to manage our supply chain effectively, or if the federal government increases the imposition of tariffs to goods imported from countries where we do business, our ability to conduct our business will be materially impaired, which would adversely impact our gross margins and results of operations.

Up until 2018, substantially all of our products were manufactured in China. In the first half of 2019, we completed activities to realign our supply chain operations to move substantially all of our product manufacturing to locations outside of China. The transition of global supply chain operations is complex, requires significant resources and unanticipated costs, involves significant third-party dependencies and carries numerous risks of disruptions to the manufacture and supply of our products, including exacerbation of the risks associated with our reliance upon third-party manufacturing and supply partners. In particular, in the first quarter of 2019, we experienced product shortages due to production delays associated with the transition of our global supply chain operations that impaired our ability to fulfill customer orders and resulted in revenue below our plan. The manufacture of our products requires components and materials sourced from suppliers in China, including optical-electronic components and materials manufactured in China. We continue to face increasing competition for components and resources from third-party manufacturing and supply partners as more companies seek to transition manufacturing operations out of China due to the ongoing uncertainty of the escalating tariff wars. We may experience further disruptions, product unavailability, delays or unanticipated costs associated with the supply of our products, particularly in light of the current COVID-19 pandemic, which would adversely affect the demand for our products and have a material adverse effect on our business, gross margins and results of operations if we are unable to manage our supply chain effectively, secure our desired rates for the manufacture and supply of our products with new supply chain partners or if the federal government increases the imposition of tariffs to goods imported from additional countries where we produce some of our products.

We depend on sole-source, single-source and limited-source suppliers for some key components. If we and our business partners are unable to source these components on a timely or cost-effective basis, we will not be able to deliver our products to our customers.

We depend on sole-source, single-source and limited-source suppliers for some key components of our products. For example, certain of our application-specific integrated circuit processors and resistor networks are purchased from sole-source suppliers, including certain components sourced solely through suppliers located in China.

Any of the sole-source, single-source and limited-source suppliers upon whom we or our business partners rely could stop producing our components, be subject to tariffs, epidemics or other conditions that disrupt their operations, cease operations or enter into exclusive arrangements with our competitors. For example, we have encountered disruptions in our supply of certain components sourced from China as a result of the COVID-19 pandemic, which have resulted in production delays for our products due to longer lead times for such components, and from continued uncertainty around trade and tariff policies between the U.S. and China. Disruptions of manufacturing activities in China business activities, particularly if prolonged, may adversely affect our ability to obtain components and materials needed to manufacture our products at acceptable prices or at all, which would in turn harm our business and results of operations. We may also experience shortages or delay of critical components as a result of growing demand in the industry or other sectors. For example, growth in electronic and IoT devices, wireless products, automotive electronics and artificial intelligence all drive increased demand for certain components, such as chipsets and memory products, which may result in lower availability and increased prices for such components. The cost of components may also be impacted by regulatory requirements.

In addition, purchase volumes of such components may be too low for Calix to be considered a priority customer by these suppliers, and we may not be able to negotiate commercially reasonable terms for our business needs. As a result, these suppliers could stop selling to us and our business partners at commercially reasonable prices, or at all. Any such interruption or delay may force us and our business partners to seek similar components from alternative sources, which may not be available, or result in higher than anticipated prices for such components. Switching suppliers could also require that we redesign our products to accommodate new components and could require us to re-qualify our products with our customers, which would be costly and time consuming. Any interruption in the supply of sole-source, single-source or limited-source components for our products would adversely affect our ability to meet scheduled product deliveries to our customers, could result in lost revenue or higher expenses and would harm our business.

We do not have manufacturing capabilities, and therefore we depend solely upon a small number of third-party manufacturing partners to manufacture and supply our products. Consequently, our operations are highly dependent upon our third-party manufacturing partners and our business could be disrupted if we encounter problems with any of these partners.

We do not have internal manufacturing capabilities and rely upon a small number of third-party manufacturing partners such as CMs and ODMs to supply our products to meet customer needs. Our reliance on a small number of manufacturing partners makes us vulnerable to possible supply and capacity constraints and reduced control over component availability, delivery schedules, quality, manufacturing yields and costs. Our business operations and ability to supply our products are highly dependent upon our manufacturing partners. Accordingly, if we encounter problems or other disruptions in our business with any of these manufacturing partners, particularly in light of the current COVID-19 pandemic, our business could be disrupted.

In some cases, we do not have supply contracts with our manufacturing partners and these manufacturers are not contractually obligated to supply products to us for any specific period, in any specific quantity or at any certain price. In addition, we are dependent upon our manufacturing partners' quality systems and controls and the adherence of such systems and controls to applicable standards. If our manufacturing partners fail to maintain levels of quality manufacture suitable for us or our customers, we may incur higher costs and our relationships with our customers may be harmed.

The revenue that our manufacturing partners generate from our orders represent a relatively small percentage of their overall revenue. As a result, fulfilling our orders may not be considered a priority if such manufacturers are constrained in their ability to fulfill all of their customer obligations in a timely manner. In addition, a substantial part of our manufacturing is done in our manufacturers' facilities that are located outside of the United States. We believe that the location of these facilities outside of the United States increases supply risk, including the risk of supply interruptions or reductions in manufacturing quality or controls. Moreover, regulatory changes or government actions relating to export or import regulations, economic sanctions or related legislation, or the possibility of such changes or actions, may create uncertainty or result in changes to or disruption in our operations with our manufacturers.

If any of our manufacturing partners were unable or unwilling to continue manufacturing our products in required volumes and at high quality levels, we would have to identify, qualify and select acceptable alternative manufacturers which could disrupt our ability to maintain continuous supply of product to meet customer requirements. An alternative manufacturer may not be available to us when needed or may not be in a position to satisfy our production requirements at commercially reasonable prices and quality. Any significant interruption in manufacturing, including labor shortages or competition for components, would require us to reduce our supply of products to our customers, which in turn would reduce our revenue and harm our relationships with our customers.

We utilize domestic and international third-party vendors to assist in the design, development and manufacture of certain of our products, and to provide logistics services in the distribution of our products. If these vendors fail to provide these services, we could incur additional costs and delays or lose revenue.

From time to time we enter into agreements for the design, development and/or manufacture of certain of our products in order to enable us to offer products on an accelerated basis. We also rely upon limited third-party vendors for logistics services to distribute our products. If any of these third-party vendors stop providing their services, for any reason, we would have to obtain similar services from alternative sources, which may not be available on commercially reasonable terms, if at all. We also have limited control over disruptions that may occur at the facilities of these third-party partners, such as supply interruptions, labor shortages, strikes, design and manufacturing failures, quality control issues, systems failures or even facility closures arising from the COVID-19 pandemic that may interrupt transportation and logistics services. In addition, switching development firms or manufacturers could require us to extend our development timeline and/or re-qualify our products with our customers, which would also be costly and time-consuming.

Any interruption in the development, supply or distribution of our products would adversely affect our ability to meet scheduled product deliveries to our customers, or exacerbate delays in customer order fulfillment that have already resulted from recent product unavailability related to the supply chain transition efforts described above, and could result in lost revenue or higher costs, which would negatively impact our margins and operating results and harm our business.

If we fail to forecast our manufacturing requirements accurately or fail to properly manage our inventory with our third-party manufacturers, we could incur additional costs, experience manufacturing delays and lose revenue.

We bear inventory risk under our third-party manufacturing arrangements. Lead times for the materials and components that we order through our manufacturers vary significantly and depend on numerous factors, including the specific supplier and market demand for a component at a given time. Lead times for certain key materials and components incorporated into our products are currently lengthy and further exacerbated by the COVID-19 pandemic, requiring our manufacturers to order materials and components several months in advance of manufacture, which impacts the lead time for our products.

If we overestimate our production requirements, our manufacturers may purchase excess components and build excess inventory, and we could be required to pay for these excess parts or products and their storage costs. We have in the past had to reimburse our primary CM for certain inventory purchases that have been rendered excess or obsolete. Examples of when inventory may be rendered excess or obsolete include manufacturing and engineering change orders resulting from design changes or in cases where inventory levels greatly exceed projected demand. If we incur payments to our manufacturers associated with excess or obsolete inventory, this may have an adverse effect on our gross margins, financial condition and results of operations.

We have experienced unanticipated increases in demand from customers, including from higher consumer demand for internet services due to COVID-19, which in turn has resulted in delayed shipments and variable shipping patterns. If we underestimate our product requirements, our manufacturers may have inadequate component inventory, which could interrupt manufacturing of our products, increase our cost of product revenue associated with expedite fees and air freight and/or result in delays or cancellation of sales. If we are unable to deliver products in a timely fashion to our customers, we may lose customer goodwill or our customers may choose to purchase from other vendors, all of which may have a material negative impact on our revenue and operating results.

Furthermore, while we have largely transitioned our global supply chain operations to mitigate the impact of U.S. tariffs imposed on goods imported from China, we have experienced and may continue to experience production interruptions from our manufacturers, particularly in light of the current COVID-19 pandemic.

Our business is dependent on the capital spending patterns of CSPs, and any decrease or delay in capital spending by CSPs in response to economic conditions, seasonality, uncertainties associated with the implementation of regulatory reform or otherwise would reduce our revenue and harm our business.

Demand for our products depends on the magnitude and timing of capital spending by CSPs as they construct, expand, upgrade and maintain their access networks. Current disruptions to the global economy due to the COVID-19 pandemic and any future economic downturns may cause a slowdown in telecommunications industry spending, including in the specific geographies and markets in which we operate. In response to reduced consumer spending, challenging capital markets or declining liquidity trends, capital spending for network infrastructure projects of CSPs could be delayed or canceled. In addition, capital spending is cyclical in our industry, sporadic among individual CSPs and can change on short notice. As a result, we may not have visibility into changes in spending behavior until nearly the end of a given quarter.

CSP spending on network construction, maintenance, expansion and upgrades is also affected by reductions in their budgets, delays in their purchasing cycles, access to external capital (such as government grants and loan programs or the capital markets) and seasonality and delays in capital allocation decisions. For example, our CSP customers tend to spend less in the first quarter as they are still finalizing their annual budgets and in certain regions customers are also challenged by winter weather conditions that inhibit outside fiber deployment, resulting in weaker demand for our products in the first quarter of our fiscal year. Also, softness in demand across any of our customer markets, including due to macro-economic conditions beyond our control or uncertainties associated with the implementation of regulatory reform, has in the past and could in the future lead to unexpected slowdown in capital expenditures by service providers.

Many factors affecting our results of operations are beyond our control, particularly in the case of large CSP orders and network infrastructure deployments involving multiple vendors and technologies where the achievement of certain thresholds for acceptance is subject to the readiness and performance of the CSP or other providers and changes in CSP requirements or installation plans. Further, CSPs may not pursue investment for our new platforms or infrastructure upgrades that require our access systems and software. Infrastructure improvements may be delayed or prevented by a variety of factors including cost, regulatory obstacles (including uncertainties associated with the implementation of regulatory reforms), mergers, lack of consumer demand for advanced communications services and alternative approaches to service delivery. Reductions in capital expenditures by CSPs, particularly CSPs that are significant customers, may have a material negative impact on our revenue and results of operations and slow our rate of revenue growth. As a consequence, our results for a particular period may be difficult to predict, and our prior results are not necessarily indicative of results in future periods.

Our markets are rapidly changing, which makes it difficult to predict our future revenue and plan our expenses appropriately.

We compete in markets characterized by rapid technological change, changing needs of CSPs, evolving industry standards and frequent introductions of new products and services. We invest significant amounts to pursue innovative technologies that we believe will be adopted by CSPs. For example, we have invested and continue to invest resources and funds in our cloud and software platforms. In addition, on an ongoing basis we expect to reposition our product and service offerings and introduce new products and services as we encounter rapidly changing CSP requirements and increasing competitive pressures. If we cannot increase sales of our new products and services, keep pace with rapid technological developments to meet our customers' needs and compete with evolving industry standards or if the technologies we choose to invest in fail to meet customer needs or are not adopted by customers in the timeframes that we expect, it would be difficult to forecast our future revenue and plan our operating expenses.

Government-sponsored programs and U.S. federal government shutdowns could impact the timing and buying patterns of CSPs, which may cause fluctuations in our operating results.

We sell to CSPs, which include U.S.-based IOCs, which have revenue that is particularly dependent upon interstate and intrastate access charges and federal and state subsidies. The FCC and some states may consider changes to such payments and subsidies, and these changes could reduce IOC revenue. Furthermore, many IOCs use or expect to use government-supported loan programs or grants, such as Rural Utility Service loans and grants, to finance capital spending. These government-supported loan programs and grants generally include conditions such as deployment criteria, domestic preference provisions and other requirements that apply to the project and selected equipment as conditions for funding. Changes to the terms or administration of these programs, including uncertainty from government and administrative change, potential funding limitations that impact our ability to meet program requirements or funding delays due to U.S. federal government shutdowns could reduce the ability of IOCs to access capital or secure funding under government-funded programs to purchase our products and services and thus reduce our revenue opportunities.

Many of our customers were awarded grants or loans under government stimulus programs or funds distributed under the FCC's CAF program, and have purchased and will continue to purchase products from us or other suppliers while such programs and funding are available. However, customers may substantially curtail purchases as funding winds down or as planned purchases are completed.

In addition to the impact of U.S. federal government shutdowns, any changes in government regulations and subsidies could also cause our customers to change their purchasing decisions, which could have an adverse effect on our operating results and financial condition. For example, the federal government has announced the Rural Digital Opportunity Fund, or RDOF, as an extension to the CAF program with a funding process that differs from some earlier CAF programs.

We face intense competition that could reduce our revenue and adversely affect our financial results.

The market for our products is highly competitive, and we expect competition from both established and new companies to increase. Our competitors include companies such as ADTRAN, Inc.; Amazon; Casa Systems; Ciena Corporation; Cisco Systems Inc.; CommScope Inc.; DASAN Zhone Solutions, Inc.; Huawei Technologies Co. Ltd.; Juniper Networks Inc.; Nokia Corporation; Plume Design, Inc. and ZTE Corporation, among others.

Our ability to compete successfully depends on a number of factors, including:

- the successful development of new products;
- our ability to anticipate CSP and market requirements and changes in technology and industry standards;
- our ability to differentiate our products from our competitors' offerings based on performance, cost-effectiveness or other factors;
- our ability to meet increased customer demand for services and support for their network requirements;
- our ability to gain customer acceptance of our products; and
- our ability to market and sell our products.

The broadband access equipment market has undergone and continues to undergo consolidation, as participants have merged, made acquisitions or entered into partnerships or other strategic relationships with one another to offer more comprehensive solutions than they individually had offered. Examples include Arris Group's acquisition of Pace plc in January 2016; Nokia's acquisition of Alcatel-Lucent in January 2016; the merger of DASAN Zhone Solutions with DASAN Network Solutions in September 2016; and CommScope's acquisition of Arris in April 2019. We expect this trend to continue as companies attempt to strengthen or maintain their market positions in an evolving industry.

Many of our current or potential competitors have longer operating histories, greater name recognition, larger customer bases and significantly greater financial, technical, sales, marketing and other resources than we do and are better positioned to acquire and offer complementary products and services. Many of our competitors have broader product lines and can offer bundled solutions, which may appeal to certain customers. Our competitors may also invest additional resources in developing more compelling product offerings. Potential customers may also prefer to purchase from their existing suppliers rather than a new supplier, regardless of product performance or features, because the products that we and our competitors offer require a substantial investment of time and funds to qualify and install. Moreover, the recent demand on network capacity as a result of shelter-in-place restrictions and shift towards remote workforces may attract new market entrants with competitive or substitutive products, which may lead to increased sales cycles, cause pricing pressure and impact CSP adoption of our platforms due to the availability of broader product offerings in the home networking market.

Some of our competitors may offer substantial discounts or rebates to win new customers or to retain existing customers. If we are forced to reduce prices in order to secure customers, we may be unable to sustain gross margin at desired levels or achieve profitability. Competitive pressures could result in increased pricing pressure, reduced profit margin, increased sales and marketing expenses and failure to increase, or the loss of, market share, any of which could reduce our revenue and adversely affect our financial results.

Product development is costly, and if we fail to develop new products or enhancements that meet changing CSP requirements, we could experience lower sales.

Our industry is characterized by rapid technological advances, frequent new product introductions, evolving industry standards and unanticipated changes in subscriber requirements. Our future success will depend significantly on our ability to anticipate and adapt to such changes, and to offer, on a timely and cost-effective basis, products and features that meet changing CSP demands and industry standards. We intend to continue to invest in developing new products and enhancing the functionality of our platforms, including to reach a broader set of customers. Developing our products is expensive and complex and involves uncertainties, including pricing risks from sourcing sufficient quantities of custom components from limited suppliers on terms which may not be commercially acceptable for us. We may not have sufficient resources to successfully manage lengthy product development cycles. Our research and development expenses were $41.6 million, or 19% of our revenue, for the first six months of 2020, $81.2 million, or 19% of total revenue, in 2019, $90.0 million, or 20% of total revenue, in 2018 and $127.5 million, or 25% of total revenue, in 2017. We believe that we must continue to dedicate a significant amount of resources to our research and development efforts, including increased reliance on third-party partners to maintain our competitive position. As we continue to invest in third-party partners to develop additional features to our product and service platforms, we may experience increased challenges in design, integration and support of such third-party features in our product and service offerings. These investments may take several years to generate positive returns, if ever. Furthermore, certain of our engineering services arrangements impose future payment obligations, in the form of minimum revenue-share payments on the sale of the developed products, that are set based on our expectations of future customer demand associated with the developed products, and require us to make minimum payments whether or not we achieve the desired customer demand. If our forecasts for the developed products fall short of expectations, we may have an asset impairment related to said products, which could adversely affect our financial results. In addition, we may experience design, manufacturing, software development quality, support, marketing and other difficulties that could delay or prevent the development, introduction or marketing of new products and enhancements. If we fail to meet our development targets, demand for our products will decline.

In addition, the introduction of new or enhanced products also requires that we manage the transition from older products to these new or enhanced products in order to minimize disruption in customer ordering patterns, fulfill ongoing customer commitments and ensure that adequate supplies of new products are available for delivery to meet anticipated customer demand. If we fail to maintain compatibility with other software or equipment found in our customers' existing and planned networks, or if our products cannot be effectively deployed in our customer networks to provide desired services, we may face substantially reduced demand for our products, which would reduce our revenue opportunities and market share. Moreover, as customers complete infrastructure deployments, they may require greater levels of service and support than we have provided in the past. We may not be able to provide products, services and support to compete effectively for these market opportunities. If we are unable to anticipate and develop new products or enhancements to our existing products on a timely and cost-effective basis, our products may become technologically obsolete more rapidly than anticipated over time, resulting in lower sales which would harm our business.

Our sales cycles can be long and unpredictable, and our sales efforts require considerable time and expense. As a result, our sales are difficult to predict and may vary substantially from quarter to quarter, which may cause our operating results to fluctuate significantly.

The timing of our revenue is difficult to predict. Our sales efforts often involve educating CSPs about the use and benefits of our products. CSPs typically undertake a significant evaluation process, which frequently involves not only our products but also those of our competitors and results in a lengthy sales cycle. Sales cycles for larger customers are relatively longer and require considerably more time and expense. We spend substantial time, effort and money in our sales efforts without any assurance that our efforts will produce sales. In addition, product purchases are frequently subject to budget constraints, multiple approvals and unplanned administrative, processing and other delays. The timing of revenue related to sales of products and services that have installation requirements may be difficult to predict due to interdependencies that may be beyond our control, such as CSP testing and turn-up protocols or other vendors' products, services or installations of equipment upon which our products and services rely. Such delays may result in fluctuations in our quarterly revenue. If sales expected from a specific customer for a particular quarter are not realized in that quarter or at all, we may not achieve our revenue forecasts and our financial results would be adversely affected.

Our focus on CSPs with relatively small networks limits our revenue from sales to any one customer and makes our future operating results difficult to predict.

A large portion of our sales efforts continue to be focused on CSPs with relatively small networks, cable MSOs and selected international CSPs. A portion of our current and potential customers generally operate small networks with limited capital expenditure budgets. Accordingly, we believe the potential revenue from the sale of our products to any one of these customers is limited. As a result, we must identify and sell products to new customers each quarter to continue to increase our sales. In addition, the spending patterns of many of these customers are generally less formal and often characterized by small and sporadic purchases, which may make our future operating results difficult to predict.

We do not have long-term, committed-volume purchase contracts with our customers, and therefore have no guarantee of future revenue from any customer.

We typically have not entered into long-term, committed-volume purchase contracts with our customers, including our key customers which account for a material portion of our revenue. As a result, any of our customers may cease to purchase our products at any time. In addition, our customers may attempt to renegotiate terms of sale, including price and quantity. If any of our key customers stop purchasing our access platforms, systems and software for any reason, our business and results of operations would be harmed.

Our efforts to increase our sales to CSPs globally, including cable MSOs, may be unsuccessful.

Our sales and marketing efforts have been focused on CSPs in North America. Part of our long-term strategy is to increase sales to CSPs globally, including cable MSOs. We have devoted and continue to devote substantial technical, marketing and sales resources to these larger CSPs, who have lengthy equipment qualification and sales cycles, without any assurance of generating sales. In particular, sales to these larger CSPs may require us to upgrade our products to meet more stringent performance criteria and interoperability requirements, develop new customer-specific features or adapt our products to meet international standards. Implementing these requirements and features is costly and could negatively impact our operating results, financial condition and cash flows. Moreover, if we are unable to obtain materials at favorable costs, our margins and profitability could be adversely impacted. For example, we work with large CSPs in testing and laboratory trials for our NG-PON2 technology and cable MSO applications. We have invested and expect to continue to invest considerable time, effort and expenditures, including investment in product research and development, related to these opportunities without any assurance that our efforts will produce orders or revenue. If we are unable to successfully increase our sales to larger CSPs, our operating results, financial condition, cash flows and long-term growth may be negatively impacted.

Increasing data privacy regulations could impact our business and expose us to increased liability.

Government and regulatory authorities in the United States and around the world have implemented and are continuing to implement broader and more stringent laws and regulations concerning data protection. For example, in July 2016, the European Commission adopted the EU-U.S. Privacy Shield to replace Safe Harbor as a compliance mechanism for the transfer of personal data from the European Union to the United States. In addition, the General Data Protection Regulation, or GDPR, adopted by the European Parliament became effective in May 2018 to harmonize data privacy laws across Europe. Among other requirements, the GDPR imposes specific duties and requirements upon companies that collect, process or control personal data of European Union residents. Although we currently do not have material operations or business in the European Union, the GDPR regulations could cause us to incur substantial costs in order to expand our business or deliver certain services in the European Union. Furthermore, the GDPR imposes penalties for noncompliance of up to the greater of €20 million or 4% of a company's worldwide revenue; accordingly, any non-compliance with the GDPR could result in a material adverse effect on our business, financial condition and results of operations. In addition, the United Kingdom's exit from the European Union creates uncertainty with respect to whether the United Kingdom will enact data protection laws or regulations designed to be consistent with the GDPR. Moreover, the California Consumer Privacy Act became effective in California in January 2020 and provides new data privacy rights for consumers and new operational requirements for companies. The interpretation and application of these data protection laws and regulations are often uncertain and in flux, and it is possible that they may be interpreted and applied in a manner that is inconsistent with our data practices. Complying with emerging and changing laws could cause us to incur substantial costs or require us to change our business practices in a manner adverse to our business.

Concerns about or regulatory actions involving our practices with regard to the collection, storage, processing, use or disclosure of customer information or other privacy related matters, even if unfounded, could damage our reputation and adversely affect operating results. While we strive to provide transparency about our collection, use, disclosure and security over any personal data and to comply with all applicable data protection laws and regulations, the failure or perceived failure to comply may result in inquiries and other proceedings or actions against us by government entities or others, or could cause us to lose customers, which could potentially have an adverse effect on our business.

Security breaches and data loss may expose us to liability, harm our reputation and adversely affect our business.

As part of our business operations, we collect, store, process, use and/or disclose sensitive data relating to our business, including in connection with the provision of our cloud services and in our information systems and data centers (including third-party data centers). In some cases, we use third-party service providers for services that may include the collection, handling, processing and/or storage of personal data on our behalf. In addition, we host our customers' subscriber data in third-party data centers in the course of providing services and solutions to our customers through our cloud and smart home and business subscriptions. While we and our service providers apply multiple layers of security to control access to data and use encryption and authentication technologies to secure data from unauthorized access, use, alteration and disclosure, these security measures may be compromised. Malicious hackers may attempt to gain access to our network or data centers; steal proprietary information related to our business, products, employees, and customers; or interrupt our systems and services or those of our customers or others. In particular, there has been a spike in cybersecurity attacks as shelter in place orders and work from home requirements have led businesses to increase reliance on virtual environments and communications systems, which have been subjected to increasing third-party vulnerabilities and security risks. Although we monitor our networks and continue to enhance our security protections, particularly as we transition to a work-from-anywhere workforce, hackers are increasingly more sophisticated and aggressive, and our efforts may be inadequate to prevent all incidents of data breach or theft. The theft, loss, or misuse of personal data collected, stored or processed by us or our service providers to run our business could result in significantly increased security and remediation costs or costs related to defending legal claims. If we or our service providers do not allocate and effectively implement and manage the resources necessary to maintain adequate security measures, we could be subjected to data loss, unauthorized data disclosure or a compromise or breach of our systems or those of our third-party data centers. As we transition to a work-from-anywhere workforce and continue to grow our cloud and software portfolio, risks arising from or related to security breaches or data loss are likely to increase. Any loss of data or compromise of our systems or data centers could result in a loss of confidence in the security of our offerings, damage our reputation, cause the loss of current or potential customers or partners, lead to legal and regulatory liability and adversely affect our business, financial condition, operating results and cash flows.

If we experience protracted disruption in functionality or processing capabilities of our newly migrated enterprise resource planning system, or ERP system, we may not be able to effectively transact our business or produce our financial statements on a timely basis and without incurrence of additional costs, which would adversely affect our business, results of operations and cash flows.

In January 2020, we migrated our Oracle ERP system to Oracle's cloud platform. This migration involved significant complexity, requiring us to move and reconfigure all of our current system processes, transactions, data and controls to a new Oracle platform. We may experience difficulties and delays in transacting our business due to system challenges, limitations in functionality, inadequate change management or process deficiencies in the production use of the ERP system. With the migration to Oracle's cloud platform, we are highly dependent upon Oracle to host, manage and maintain our ERP system and any disruptions to their business or processes, or delays in their ability to provide services to us, may in turn disrupt our business operations or increase costs. Furthermore, we will receive quarterly system updates and enhancements on the cloud platform according to Oracle's release timeline and change management processes, which if not managed properly may disrupt our business operations and delay our ability to process transactions and produce reports necessary to conduct our business. We are highly dependent upon our ERP system for critical business functions, including order processing and management, supply chain and procurement operations, financial planning, accounting and reporting; accordingly, protracted disruption in functionality or processing capabilities of the ERP system could materially impair our ability to conduct our business, process transactions timely or to produce accurate financial statements on a timely basis. If our ability to conduct our business, process transactions or to produce accurate financial statements on a timely basis remains impaired, our business, results of operations and cash flows would be adversely affected.

We are exposed to the credit risks of our customers; if we have inadequately assessed their creditworthiness, we may have more exposure to accounts receivable risk than we anticipate. Failure to collect our accounts receivable in amounts that we anticipate could adversely affect our operating results and financial condition.

In the course of our sales to customers, we may encounter difficulty collecting accounts receivable and could be exposed to risks associated with uncollectible accounts receivable. We maintain an allowance for doubtful accounts for estimated losses resulting from the inability or unwillingness of our customers to make required payments. However, these allowances are based on our judgment and a variety of factors and assumptions.

We perform credit evaluations of our customers' financial condition. However, our evaluation of the creditworthiness of customers may not be accurate if they do not provide us with timely and accurate financial information, or if their situations change after we evaluate their credit. Furthermore, some of our international customers operate in countries with developing economies, which from time to time, experience financial crises and become unable to make payments in U.S. dollars. The COVID-19 pandemic has also presented financial challenges to numerous businesses, which may result in liquidity issues leading to heightened difficulties with collections. While we attempt to monitor these situations carefully, adjust our allowances for doubtful accounts as appropriate and take measures to collect accounts receivable balances, we have written down accounts receivable and written off doubtful accounts in prior periods and may be unable to avoid additional write-downs or write-offs of doubtful accounts in the future. Such write-downs or write-offs could negatively affect our operating results for the period in which they occur and could harm our cash flow or our financial condition.

Our products must interoperate with many software applications and hardware products found in our customers' networks. If we are unable to ensure that our products interoperate properly, our business will be harmed.

Our products must interoperate with our customers' existing and planned networks, which often have varied and complex specifications, utilize multiple protocol standards, include software applications and customizations and products from multiple vendors and contain multiple generations of products that have been added over time. As a result, we must continually ensure that our products interoperate properly with these existing and planned networks. To meet these requirements, we must undertake development efforts, including test protocols, that require substantial capital investment and employee resources. We may not accomplish these development goals quickly or cost-effectively, if at all. If we fail to maintain compatibility with other software or equipment found in our customers' existing and planned networks, we may face substantially reduced demand for our products, which would reduce our revenue opportunities and market share.

We have entered into interoperability arrangements with a number of equipment and software vendors for the use or integration of their technology with our products. These arrangements give us access to and enable interoperability with various products that we do not otherwise offer. If these relationships fail, we may have to devote substantially more resources to the development of alternative products and processes and our efforts may not be as effective as the combined solutions under our current arrangements. In some cases, these other vendors are either companies that we compete with directly or companies that have extensive relationships with our existing and potential customers and may have influence over the purchasing decisions of those customers. Some of our competitors have stronger relationships with some of our existing and other potential interoperability partners, and as a result, our ability to have successful interoperability arrangements with these companies may be harmed. Our failure to establish or maintain key relationships with third-party equipment and software vendors may harm our ability to successfully sell and market our products.

The quality of our support and services offerings is important to our customers, and if we fail to continue to offer high quality support and services, we could lose customers, which would harm our business.

Once our products are deployed within our customers' networks, they depend on our support organization to resolve any issues relating to those products. A high level of support is critical for the successful marketing and sale of our products. Furthermore, our services to customers have increasingly broadened to include network optimization, integration and development services and remote monitoring to help our customers deploy our products within their networks. If we do not effectively assist our customers in deploying our products, succeed in helping them quickly resolve post-deployment issues or provide effective ongoing support, it could adversely affect our ability to sell our products to existing customers and harm our reputation with potential new customers. As a result, our failure to maintain high quality support and services could result in the loss of customers, which would harm our business.

An increase in revenue mix towards services may adversely affect our gross margin.

In response to greater customer demand for certain services for our products, we continue to invest and grow our services business while de-prioritizing lower gross margin deployment services. Our services include product warranty and support services, customer success services, customer enablement services, managed services to help our customers manage and optimize their networks, education and certification services and, to a lesser extent, deployment services. Services typically have a lower gross margin than our products, particularly as we invest in growing our service organization. Certain services, such as deployment services, may tend to involve higher costs and increased risk of cost overruns, which can negatively impact our gross margin. Moreover, if we are unable to achieve desired efficiencies and scale as we ramp and develop our services business, we may incur higher than expected costs, which can further adversely impact our gross margin.

Our products are highly technical and may contain undetected hardware defects or software bugs, which could harm our reputation and adversely affect our business.

Our products, including our smart home and business systems and our cloud and software platforms, are highly technical and, when deployed, are critical to the operation of many networks. Our products have contained and may contain undetected defects, bugs or security vulnerabilities, which risks may be exacerbated as we continue to expand our cloud and software portfolio. Some defects in our products may only be discovered after a product has been installed and used by customers and may in some cases only be detected under certain circumstances or after extended use. Any errors, bugs, defects or security vulnerabilities discovered in our products after commercial release could result in loss of revenue or delay in revenue recognition, loss of customers and increased service and warranty and retrofit costs, any of which could adversely affect our business, operating results and financial condition. In addition, we could face claims for security and data breach, product liability, tort or breach of warranty. Our contracts with customers contain provisions relating to warranty disclaimers and liability limitations, which may not be upheld. Defending a lawsuit, regardless of its merit, is costly and may divert management's attention and adversely affect the market's perception of us and our products. In addition, if our business liability insurance coverage proves inadequate or future coverage is unavailable on acceptable terms or at all, our business, operating results and financial condition could be adversely impacted.

Our estimates regarding future warranty or product obligations may change due to product failure rates, shipment volumes, field service obligations and rework costs incurred in correcting product failures. If our estimates change, the liability for warranty or product obligations may be increased, impacting future cost of revenue.

Our products are highly complex, and our product development, manufacturing and integration testing may not be adequate to detect all defects, errors, failures and quality issues. Quality or performance problems for products covered under warranty could adversely impact our reputation and negatively affect our operating results and financial position. The development and production of new products with high complexity often involves problems with software, components and manufacturing methods. If significant warranty or other product obligations arise due to reliability or quality issues arising from defects in software, faulty components or improper manufacturing methods, our operating results and financial position could be negatively impacted by:

- cost associated with fixing software or hardware defects;
- high service and warranty expenses;
- high inventory obsolescence expense;
- delays in collecting accounts receivable;
- payment of liquidated damages for performance failures; and
- declining sales to existing customers.

As the market for our products evolves, changing customer requirements may adversely affect the valuation of our inventory.

Customer demand for our products can change rapidly in response to market and technology developments. Demand can be affected not only by customer- or market-specific issues, but also by broader economic and/or geopolitical factors. We may, from time to time, adjust inventory valuations downward or end of life certain of our products in response to our assessment of our business strategy as well as consideration of demand from our customers for specific products or product lines. The related excess inventory charges may have an adverse effect on our gross margin, financial condition and results of operations.

If we fail to comply with evolving industry standards, sales of our existing and future products would be adversely affected.

The markets for our products are characterized by a significant number of standards, both domestic and international, which are evolving as new technologies are developed and deployed. As we expand into adjacent markets and increase our international footprint, we are likely to encounter additional standards. Our products must comply with these standards in order to be widely marketable. In some cases, we are compelled to obtain certifications or authorizations before our products can be introduced, marketed or sold in new markets or to customers that we have not historically served. For example, our ability to maintain Operations System Modification for Intelligent Network Elements certification for our products will affect our ongoing ability to continue to sell our products to large CSPs.

In addition, our ability to expand our international operations and create international market demand for our products may be limited by regulations or standards adopted by other countries that may require us to redesign our existing products or develop new products suitable for sale in those countries. Although we believe our products are currently in compliance with domestic and international standards and regulations in countries in which we currently sell, we may not be able to design our products to comply with evolving standards and regulations in the future. This ongoing evolution of standards and differing foreign regulations may directly affect our ability to market or sell our products, particularly with regards to our cloud and software platforms in international markets. Further, the cost of complying with the evolving standards and regulations or the failure to obtain timely domestic or foreign regulatory approvals or certification could prevent us from selling our products where these standards or regulations apply, which would result in lower revenue and lost market share.

We may be unable to successfully expand our international operations. In addition, we may be subject to a variety of international risks that could harm our business.

We currently generate most of our sales from customers in North America and have more limited experience marketing, selling and supporting our products and services outside North America or managing the administrative aspects of a worldwide operation. Our ability to expand our international operations is dependent on our ability to create or maintain international market demand for our products. In addition, as we expand our operations internationally, our support organization will face additional challenges including those associated with delivering support, training and documentation in languages other than English. If we invest substantial time and resources to expand our international operations and are unable to do so successfully and in a timely manner, our business, financial condition and results of operations may suffer.

In the course of expanding our international operations and operating overseas, we will be subject to a variety of risks, including:

- differing regulatory requirements, including tax laws, trade laws, data privacy laws, labor regulations, tariffs, export quotas, custom duties or other trade restrictions;
- liability or damage to our reputation resulting from corruption or unethical business practices in some countries;
- exposure to effects of fluctuations in currency exchange rates if, over time, international customer contracts are increasingly denominated in local currencies;
- longer collection periods and difficulties in collecting accounts receivable;
- greater difficulty supporting and localizing our products;
- added costs of supporting cloud infrastructure outside of the United States;
- different or unique competitive pressures as a result of, among other things, the presence of local equipment suppliers;
- challenges inherent in efficiently managing an increased number of employees over large geographic distances, including the need to implement appropriate systems, policies and compensation, benefits and compliance programs;
- limited or unfavorable intellectual property protection;
- risk of change in international political or economic conditions, terrorist attacks or acts of war; and
- restrictions on the repatriation of earnings.

We engage resellers to promote, sell, install and support our products to some customers in North America and internationally. Their failure to do so or our inability to recruit or retain appropriate resellers may reduce our sales and thus harm our business.

We engage some value-added resellers, or VARs, who provide sales and support services for our products. We compete with other telecommunications systems providers for our VARs' business and many of our VARs are free to market competing products. Our use of VARs and other third-party support partners and the associated risks of doing so are likely to increase as we expand sales outside of North America. If a VAR promotes a competitor's products to the detriment of our products or otherwise fails to market our products and services effectively, we could lose market share. In addition, the loss of a key VAR or the failure of VARs to provide adequate customer service could have a negative effect on customer satisfaction and could cause harm to our business. If we do not properly recruit and train VARs to sell, install and service our products, our business, financial condition and results of operations may suffer.

We may have difficulty evolving and scaling our business and operations to meet customer and market demand, which could result in lower profitability or cause us to fail to execute on our business strategies.

In order to grow our business, we will need to continually evolve and scale our business and operations to meet customer and market demand. Evolving and scaling our business and operations places increased demands on our management as well as our financial and operational resources to effectively:

- manage organizational change;
- manage a larger organization;
- accelerate and/or refocus research and development activities;
- expand our manufacturing, supply chain and distribution capacity;
- increase our sales and marketing efforts;

- broaden our customer-support and services capabilities;
- maintain or increase operational efficiencies;
- scale support operations in a cost-effective manner;
- implement appropriate operational and financial systems; and
- maintain effective financial disclosure controls and procedures.

If we cannot evolve and scale our business and operations effectively, we may not be able to execute our business strategies in a cost-effective manner and our business, financial condition, profitability and results of operations could be adversely affected.

We may not be able to protect our intellectual property, which could impair our ability to compete effectively.

We depend on certain proprietary technology for our success and ability to compete. We rely on intellectual property laws as well as nondisclosure agreements, licensing arrangements and confidentiality provisions to establish and protect our proprietary rights. U.S. patent, copyright and trade secret laws afford us only limited protection, and the laws of some foreign countries do not protect proprietary rights to the same extent. Our pending patent applications may not result in issued patents, and our issued patents may not be enforceable. Any infringement of our proprietary rights could result in significant litigation costs. Further, any failure by us to adequately protect our proprietary rights could result in our competitors offering similar products, resulting in the loss of our competitive advantage and decreased sales.

It may become more difficult to adequately protect our intellectual property as we expand our reliance on third parties for the design, development and/or manufacture of our products and as we transition to a work-from-anywhere workforce. While our contracts with such third parties contain provisions relating to intellectual property rights, indemnification and liability, they may not be adequately enforced. Our third-party providers may also be subject to unauthorized third-party copying or use of our proprietary rights. In addition, as we transition to a work-from-anywhere workforce and implement different technologies for a distributed workforce, we may become subject to increased risks arising from or related to security breaches or data loss.

Despite our efforts to protect our proprietary rights, attempts may be made to copy or reverse engineer aspects of our products or to obtain and use information that we regard as proprietary. Accordingly, we may be unable to protect our proprietary rights against unauthorized third-party copying or use. Furthermore, policing the unauthorized use of our intellectual property is difficult and costly. Litigation may be necessary in the future to enforce our intellectual property rights, to protect our trade secrets or to determine the validity and scope of the proprietary rights of others. Litigation could result in substantial costs, diversion of resources and harm to our business.

We could become subject to litigation regarding intellectual property rights that could harm our business.

We may be subject to intellectual property infringement claims that are costly to defend and could limit our ability to use some technologies in the future. The risk of such claims could increase as we expand our product portfolio and increasingly rely on more technologies. Third parties may assert patent, copyright, trademark or other intellectual property rights to technologies or rights that are important to our business. Such claims may originate from non-practicing entities, patent holding companies or other adverse patent owners who have no relevant product revenue, and therefore, our own issued and pending patents may provide little or no deterrence to suit from these entities.

We have received in the past and expect that in the future we may receive communications from competitors and other companies alleging that we may be infringing their patents, trade secrets or other intellectual property rights; offering licenses to such intellectual property; threatening litigation or requiring us to act as a third-party witness in litigation. In addition, we have agreed, and may in the future agree, to indemnify our customers for expenses or liabilities resulting from certain claimed infringements of patents, trademarks or copyrights of third parties. Such indemnification may require us to be financially responsible for claims made against our customers, including costs of litigation and damages awarded, which could negatively impact our results of operations. Any claims asserting that our products infringe the proprietary rights of third parties, with or without merit, could be time-consuming, result in costly litigation and divert the efforts of our engineering teams and management. These claims could also result in product shipment delays or require us to modify our products or enter into royalty or licensing agreements. Such royalty or licensing agreements, if required, may not be available to us on acceptable terms, if at all.

Our use of open source software could impose limitations on our ability to commercialize our products.

We incorporate open source software into our products. Although we closely monitor our use of open source software, the terms of many open source software licenses have not been interpreted by the courts, and there is a risk that such licenses could be construed in a manner that could impose unanticipated conditions or restrictions on our ability to sell our products. In such event, we could be required to make our proprietary software generally available to third parties, including competitors, at no cost, to seek licenses from third parties in order to continue offering our products, to re-engineer our products or to discontinue

the sale of our products in the event re-engineering cannot be accomplished on a timely basis or at all, any of which could adversely affect our revenue and operating expenses.

If we are unable to obtain necessary third-party technology licenses, our ability to develop new products or product enhancements may be impaired.

While our current licenses of third-party technology generally relate to commercially available off-the-shelf technology, we may from time to time be required to license additional technology from third parties to develop new products or product enhancements either directly or through an ODM partner. These third-party licenses may be unavailable to us or our ODMs on commercially reasonable terms, if at all. The inability to obtain necessary third-party licenses may force us to accept substitute technology of lower quality or performance standards or at greater cost or may increase the time-to-market of our products or product enhancements, any of which could harm the competitiveness of our products and result in lost revenue.

Our ability to incur debt and the use of our funds could be limited by borrowing base restrictions and restrictive covenants in our loan and security agreement for our revolving credit facility.

In January 2020, we entered into the BofA Loan Agreement, which provides for a revolving credit facility up to a principal amount of $35.0 million, with the availability of borrowings subject to certain conditions and requirements, including the maintenance of Availability (as defined in the BofA Loan Agreement) of at least $5.0 million. We are dependent on our existing cash, cash equivalents and borrowings available under the BofA Loan Agreement to provide adequate funds for ongoing operations, planned capital expenditures and working capital requirements for at least the next twelve months. If our financial position deteriorates, our borrowing capacity under the credit facility may be reduced, which would adversely impact our business and growth. In addition, the BofA Loan Agreement includes covenants that place certain restrictions on our ability to, among other things, borrow secured debt or unsecured debt beyond a certain amount, create or suffer to exist any liens, sell or transfer any assets, make distributions, liquidate, dissolve, merge, amalgamate, combine or consolidate, or become a party to certain agreements restricting our ability to incur or repay debt, grant liens, make distributions or modify loan agreements, in each case subject to certain exceptions. Failure to maintain these covenants can limit the amount of borrowings that are available to us, increase the cost of borrowings under the facility, and/or require us to make immediate payments to reduce borrowings.

Given our current financial position and history of operating losses, it is possible that we may fail to meet the minimum levels required by the financial covenants, which would constitute an event of default under the BofA Loan Agreement. Events beyond our control could have a material adverse impact on our results of operations, financial condition or liquidity, in which case we may not be able to meet our financial covenants. For example, prior to the BofA Loan Agreement, we were party to a loan agreement with Silicon Valley Bank, or the SVB Loan Agreement, that provided us a revolving credit facility based on a customary accounts receivable borrowing base, subject to certain exceptions and conclusions. During the term of the SVB Loan Agreement, we were not able to meet the financial covenants in several of the quarters due to variability in our results of operations and financial position and had to request waivers and amendments to the SVB Loan Agreement to avoid an event of default. The BofA Loan Agreement covenants may also affect our ability to obtain future financing and to pursue attractive business opportunities and our flexibility in planning for, and reacting to, changes in business conditions. These covenants could place us at a disadvantage compared to some of our competitors, who may have fewer restrictive covenants and may not be required to operate under these restrictions.

Our failure or the failure of our manufacturers to comply with environmental and other legal regulations could adversely impact our results of operations.

The manufacture, assembly and testing of our products may require the use of hazardous materials that are subject to environmental, health and safety regulations, or materials subject to laws restricting the use of conflict minerals. Our failure or the failure of our third-party manufacturers to comply with any of these requirements could result in regulatory penalties, legal claims or disruption of production. In addition, our failure or the failure of our manufacturers to properly manage the use, transportation, emission, discharge, storage, recycling or disposal of hazardous materials could subject us to increased costs or liabilities. Existing and future environmental regulations and other legal requirements may restrict our use of certain materials to manufacture, assemble and test products. Any of these consequences could adversely impact our results of operations by increasing our expenses and/or requiring us to alter our manufacturing processes.

Regulatory and physical impacts of climate change and other natural events may affect our customers and our manufacturers, resulting in adverse effects on our operating results.

As emissions of greenhouse gases continue to alter the composition of the atmosphere, affecting large-scale weather patterns and the global climate, any new regulation of greenhouse gas emissions may result in additional costs to our customers and our manufacturers. In addition, the physical impacts of climate change and other natural events, including changes in weather patterns, drought, rising ocean and temperature levels, earthquakes and tsunamis may impact our customers, suppliers and manufacturers, and our operations. These potential physical effects may adversely affect our revenue, costs, production and delivery schedules, and cause harm to our results of operations and financial condition.

We have in the past pursued, and may in the future continue to pursue, acquisitions which involve a number of risks and uncertainties. If we are unable to address and resolve these risks and uncertainties successfully, such acquisitions could disrupt our business and result in higher costs than we anticipate.

We may in the future acquire businesses, products or technologies to expand our product offerings and capabilities, customer base and business. We have evaluated and expect to continue to evaluate a wide array of potential strategic transactions. We have limited experience making such acquisitions or integrating these businesses after such acquisitions. Any anticipated and unanticipated costs to us related to future transactions could exceed amounts that are covered by insurance and could have a material adverse impact on our financial condition and results of operations. In addition, the anticipated benefit of any acquisitions may never materialize or the process of integrating acquired businesses, products or technologies may create unforeseen operating difficulties and expenditures.

Some of the areas where we have experienced and may in the future experience acquisition-related risks include:

- expenses and distractions, including diversion of management time related to litigation;
- expenses and distractions related to potential claims resulting from any possible future acquisitions, whether or not they are completed;
- retaining and integrating employees from acquired businesses;
- issuance of dilutive equity securities or incurrence of debt;
- integrating various accounting, management, information, human resource and other systems to permit effective management;
- incurring possible write-offs, impairment charges, contingent liabilities, amortization expense of intangible assets or impairment of goodwill and intangible assets with finite useful lives;
- difficulties integrating and supporting acquired products or technologies;
- unexpected capital expenditure requirements;
- insufficient revenue to offset increased expenses associated with acquisitions; and
- opportunity costs associated with committing capital to such acquisitions.

If our goodwill becomes impaired, we may be required to record a significant charge to our results of operations. We review our goodwill for impairment annually or when events or changes in circumstances indicate the carrying value may not be recoverable, such as a sustained or significant decline in stock price and market capitalization. If the carrying value of goodwill was deemed to be impaired, an impairment loss equal to the amount by which the carrying amount exceeds the estimated fair value would be recognized. Any such impairment could materially and adversely affect our financial condition and results of operations.

Foreign acquisitions would involve risks in addition to those mentioned above, including those related to integration of operations across different cultures and languages, currency risks and the particular economic, political and regulatory risks associated with specific countries. We may not be able to address these risks and uncertainties successfully, or at all, without incurring significant costs, delays or other operating problems.

Our inability to address or anticipate any of these risks and uncertainties could disrupt our business and could have a material impact on our financial condition and results of operations.

Our use of and reliance upon development resources in China may expose us to unanticipated costs or liabilities.

We operate a wholly foreign owned enterprise in Nanjing, China, where a dedicated team of engineers performs product development, quality assurance, cost reduction and other engineering work. Our reliance upon development resources in China may not enable us to achieve meaningful product cost reductions or greater resource efficiency. Further, our development efforts and other operations in China involve significant risks, including:

- difficulty hiring and retaining appropriate engineering resources due to intense competition for such resources and resulting wage inflation;
- the knowledge transfer related to our technology and exposure to misappropriation of intellectual property or confidential information, including information that is proprietary to us, our customers and third parties;

- heightened exposure to changes in the economic, security, political and pandemic conditions that may arise in China;
- fluctuation in currency exchange rates and tax risks associated with international operations;
- development efforts that do not meet our requirements because of differences associated with international operations, resulting in errors or delays; and
- uncertainty with respect to tariffs imposed by the federal government on products imported from China and future actions the federal government may take with respect to international trade agreements and U.S. tax provisions related to international commerce that could adversely affect our international operations.

Difficulties resulting from the factors above and other risks related to our operations in China could expose us to increased expense, impair our development efforts, harm our competitive position and damage our reputation. For example, the COVID-19 outbreak first reported in Wuhan, China in December 2019 impacted our research and development operations in Nanjing, and may continue to impact our operations, including our ability to meet our desired development timelines. Government-imposed travel restrictions and closures of certain business operations in China in response to COVID-19 have disrupted and delayed the supply of component parts sourced from China and our supply chain and our suppliers' operations in and outside of China, which may reoccur in the foreseeable future if the pandemic is not contained.

Our customers are subject to government regulation, and changes in current or future laws or regulations that negatively impact our customers could harm our business.

The FCC has jurisdiction over all of our U.S. customers. FCC regulatory policies that create disincentives for investment in access network infrastructure or impact the competitive environment in which our customers operate may harm our business. For example, future FCC regulation affecting providers of broadband Internet access services could impede the penetration of our customers into certain markets or affect the prices they may charge in such markets. Similarly, changes to regulatory tariff requirements or other regulations relating to pricing or terms of carriage on communication networks could slow the development or expansion of network infrastructures. Consequently, such changes could adversely affect the sale of our products and services. Furthermore, many of our customers are subject to FCC rate regulation of interstate telecommunications services and are recipients of CAF capital incentive payments, which are intended to subsidize broadband and telecommunications services in areas that are expensive to serve. Changes to these programs, rules and regulations that could affect the ability of IOCs to access capital, and which could in turn reduce our revenue opportunities, remain possible.

In addition, many of our customers are subject to state regulation of intrastate telecommunications services, including rates for such services, and may also receive funding from state universal service funds. Changes in rate regulations or universal service funding rules, either at the U.S. federal or state level, could adversely affect our customers' revenue and capital spending plans. Moreover, various international regulatory bodies have jurisdiction over certain of our non-U.S. customers. Changes in these domestic and international standards, laws and regulations, or judgments in favor of plaintiffs in lawsuits against CSPs based on changed standards, laws and regulations could adversely affect the development of broadband networks and services. This, in turn, could directly or indirectly adversely impact the communications industry in which our customers operate.

Many jurisdictions, including international governments and regulators, are also evaluating, implementing and enforcing regulations relating to cyber security, privacy and data protection, which can affect the market and requirements for networking and communications equipment. To the extent our customers are adversely affected by laws or regulations regarding their business, products or service offerings, our business, financial condition and results of operations would suffer.

We are subject to governmental export and import controls that could subject us to liability or impair our ability to compete in additional international markets.

Our products are subject to U.S. export and trade controls and restrictions. International shipments of certain of our products may require export licenses or are subject to additional requirements for export. In addition, the import laws of other countries may limit our ability to distribute our products, or our customers' ability to buy and use our products, in those countries. Changes in our products or changes in export and import regulations or duties may create delays in the introduction of our products in international markets, prevent our customers with international operations from deploying our products or, in some cases, prevent the export or import of our products to certain countries altogether. Any change in export or import regulations, duties or related legislation, shift in approach to the enforcement or scope of existing regulations, or change in the countries, persons or technologies targeted by such regulations, could negatively impact our ability to sell, profitably or at all, our products to existing or potential international customers.

If we lose any of our key personnel, or are unable to attract, train and retain qualified personnel, our ability to manage our business and continue our growth would be negatively impacted.

Our success depends, in large part, on the continued contributions of our key personnel, many of whom are highly skilled and would be difficult to replace. None of our key personnel are bound by a written employment contract to remain with us for a specified period. In addition, we do not currently maintain key person life insurance covering our key personnel. If we lose the services of any key personnel, our business, financial condition and results of operations may suffer.

Competition for skilled personnel is intense. We cannot be certain that we will be successful in attracting and retaining qualified personnel, or that newly hired personnel will function effectively, both individually and as a group. If we are unable to effectively recruit, hire and utilize new employees to align with our company objectives, execution of our business strategy and our ability to react to changing market conditions may be impeded, and our business, financial condition and results of operations may suffer.

Volatility or lack of performance in our stock price may also affect our ability to attract and retain our key personnel. Our executive officers and employees hold a substantial number of shares of our common stock and vested stock options. Employees may be more likely to leave us if the shares they own or the shares underlying their equity awards decline in value, or if the exercise prices of stock options that they hold are significantly above the market price of our common stock. If we are unable to retain our employees, our business, operating results and financial condition will be harmed.

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired, which would adversely affect our operating results, our ability to operate our business and our stock price.

Ensuring that we have adequate internal financial and accounting controls and procedures in place to produce accurate financial statements on a timely basis is a costly and time-consuming effort that needs to be re-evaluated frequently. Our recent migration of our ERP system to Oracle’s cloud platform required us to expend substantial time to re-evaluate and update our internal controls. We have in the past discovered, and may in the future discover, areas of our internal financial and accounting controls and procedures that need improvement, particularly as we adjust to our new ERP platform.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles. Our management does not expect that our internal control over financial reporting will prevent or detect all error and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system’s objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, within our company will have been detected.

We are required to comply with Section 404 of the Sarbanes-Oxley Act, or SOX, which requires us to expend significant resources in developing the required documentation and testing procedures. We cannot be certain that the actions we have taken and are taking to improve our internal controls over financial reporting will be sufficient to maintain effective internal controls over financial reporting in subsequent reporting periods or that we will be able to implement our planned processes and procedures in a timely manner. In addition, new and revised accounting standards and financial reporting requirements may occur in the future and implementing changes required by new standards, requirements or laws may require a significant expenditure of our management’s time, attention and resources which may adversely affect our reported financial results. If we are unable to produce accurate financial statements on a timely basis, investors could lose confidence in the reliability of our financial statements, which could cause the market price of our common stock to decline and make it more difficult for us to finance our operations and growth.

We incur significant costs as a result of operating as a public company, which may adversely affect our operating results and financial condition.

As a public company, we incur significant accounting, legal and other expenses, including costs associated with our public company reporting requirements. We also anticipate that we will continue to incur costs associated with corporate governance requirements, including requirements and rules under SOX and the Dodd-Frank Wall Street Reform and Consumer Protection Act, or Dodd-Frank, among other rules and regulations implemented by the SEC, as well as listing requirements of the New York Stock Exchange, or NYSE. Furthermore, these laws and regulations could make it difficult or costly for us to obtain certain types of insurance, including director and officer liability insurance, and we may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these requirements could also make it difficult for us to attract and retain qualified persons to serve on our Board of Directors, our board committees or as executive officers.

New laws and regulations as well as changes to existing laws and regulations affecting public companies, including the provisions of SOX and the Dodd-Frank Act and rules adopted by the SEC and the NYSE, would likely result in increased costs to us as we respond to their requirements. We continue to invest resources to comply with evolving laws and regulations, and this investment may result in increased general and administrative expense.

Risks Related to Ownership of Our Common Stock

Our stock price may continue to be volatile, and the value of an investment in our common stock may decline.

The trading price of our common stock has been, and is likely to continue to be, volatile, which means that it could decline substantially within a short period of time and could fluctuate widely in response to various factors, some of which are beyond our control. These factors include those discussed above under "*Risks Related to Our Business and Industry*" and others such as:

- quarterly variations in our results of operations or those of our competitors;
- failure to meet any guidance that we have previously provided regarding our anticipated results;
- changes in earnings estimates or recommendations by securities analysts;
- failure to meet securities analysts' estimates;
- announcements by us or our competitors of new products, significant contracts, commercial relationships, acquisitions or capital commitments;
- developments with respect to intellectual property rights;
- our ability to develop and market new and enhanced products on a timely basis;
- our commencement of, or involvement in, litigation and developments relating to such litigation;
- changes in governmental regulations; and
- a slowdown in the communications industry or the general economy.

In recent years, the stock market in general, and the market for technology companies in particular, has experienced extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of those companies. Broad market and industry factors may seriously affect the market price of our common stock, regardless of our actual operating performance. Recently, the COVID-19 pandemic has severely impacted U.S. markets, causing dramatic swings in the U.S. stock exchanges that resulted in increased volatility in the trading price of our common stock. In addition, in the past, following periods of volatility in the overall market and the market price of a particular company's securities, securities class action litigation has often been instituted against these companies. This litigation, if instituted against us, could result in substantial costs and a diversion of our management's attention and resources.

If securities or industry analysts do not publish research or reports about our business or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. If any of the analysts who cover us issue an adverse or misleading opinion regarding our stock, our stock price would likely decline. If several of these analysts cease coverage of our company or fail to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

Provisions in our charter documents and under Delaware law could discourage a takeover that stockholders may consider favorable and may lead to entrenchment of our management and Board of Directors.

Our amended and restated certificate of incorporation and amended and restated bylaws contain provisions that could have the effect of delaying or preventing changes in control or changes in our management or our Board of Directors. These provisions include:

- a classified Board of Directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our Board of Directors;
- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;

- the exclusive right of our Board of Directors to elect a director to fill a vacancy created by the expansion of the Board of Directors or the resignation, death or removal of a director, which prevents stockholders from being able to fill vacancies on our Board of Directors;
- the ability of our Board of Directors to issue shares of preferred stock and to determine the price and other terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;
- the requirement that a special meeting of stockholders may be called only by the chairman of the Board of Directors, the chief executive officer or the Board of Directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- advance notice procedures that stockholders must comply with in order to nominate candidates to our Board of Directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

We are also subject to certain anti-takeover provisions under Delaware law. Under Delaware law, a corporation may not, in general, engage in a business combination with any holder of 15% or more of its capital stock unless the holder has held the stock for three years or, among other things, the Board of Directors has approved the transaction.

We may need additional capital in the future to finance our business.

We may need to raise additional capital to fund operations in the future. Our working capital needs and cash use have continued to increase to support our growth initiatives, and we may need additional capital if our current plans and assumptions change. While we have transitioned our supply chain operations to mitigate the impact of U.S. tariffs on goods imported from China, failure to effectively manage the transition or unanticipated further expenditures associated with mitigation efforts could negatively impact our cash flows and result of operations. Failure to maintain certain restrictive covenants and requirements under the BofA Loan Agreement could result in limiting the amount of borrowings that are available to us, increase the cost of borrowings under the credit facility, and/or cause us to make immediate payments to reduce borrowings or result in an event of default. If future financings involve the issuance of equity securities, our then-existing stockholders would suffer dilution. If we raise additional debt financing, we may be subject to restrictive covenants that limit our ability to conduct our business. If we are unable to generate positive operating income and positive cash flows from operations, our liquidity, results of operations and financial condition will be adversely affected. Furthermore, if we are unable to generate sufficient cash flows to support our operational needs, we may need to seek additional sources of liquidity, including borrowings, to support our working capital needs. In addition, we may choose to seek other sources of liquidity even if we believe we have generated sufficient cash flows to support our operational needs. There is no assurance that any other sources of liquidity may be available to us on acceptable terms or at all. If we are unable to generate sufficient cash flows or obtain other sources of liquidity, we will be forced to limit our development activities, reduce our investment in growth initiatives and institute cost-cutting measures, all of which would adversely impact our business and growth.

We do not currently intend to pay dividends on our common stock and, consequently, our stockholders' ability to achieve a return on their investment will depend on appreciation in the price of our common stock.

We do not currently intend to pay any cash dividends on our common stock for the foreseeable future. We currently intend to invest our future earnings, if any, to fund our growth. Additionally, the terms of our credit facility restrict our ability to pay dividends under certain circumstances. Therefore, our stockholders are not likely to receive any dividends on our common stock for the foreseeable future.

ITEM 2. Unregistered Sales of Equity Securities and Use of Proceeds

None.

ITEM 3. Defaults Upon Senior Securities

None.

ITEM 4. Mine Safety Disclosures

Not applicable.

ITEM 5. Other Information

None.

ITEM 6. Exhibits

Exhibit Number	Description
10.1*	Amended and Restated Employee Stock Purchase Plan effective April 24, 2020.
10.2*	Amended and Restated 2017 Nonqualified Employee Stock Purchase Plan effective April 24, 2020.
31.1	Certification of Chief Executive Officer of Calix, Inc. Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Chief Financial Officer of Calix, Inc. Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of Chief Executive Officer and Chief Financial Officer of Calix, Inc. Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS	XBRL Instance Document
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

* Indicates management contract or compensatory plan or arrangement.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

	CALIX, INC. (Registrant)	
Date: July 21, 2020	By:	/s/ Carl Russo
		Carl Russo
		Chief Executive Officer **(Principal Executive Officer)**
Date: July 21, 2020	By:	/s/ Cory Sindelar
		Cory Sindelar
		Chief Financial Officer **(Principal Financial Officer)**

Exhibit 10.1

CALIX, INC.
AMENDED AND RESTATED EMPLOYEE STOCK PURCHASE PLAN

Section 1. Establishment of the Plan.

The Calix, Inc. Amended and Restated Employee Stock Purchase Plan (as may be amended from time to time, the "Plan") provides Eligible Employees with an opportunity to purchase the Company's common stock so that they may increase their proprietary interest in the success of the Company. The Plan, which provides for the purchase of stock through payroll withholding, is intended to qualify under Section 423 of the Code. The Plan, which was approved by our stockholders in May 2019, amends and restates the Amended and Restated Employee Stock Purchase Plan effective as of May 17, 2017 (the "Prior Plan") in its entirety.

Section 2. Definitions.

(a) "Board of Directors" or "Board" means the Board of Directors of the Company.

(b) "Code" means the Internal Revenue Code of 1986, as amended.

(c) "Company" means Calix, Inc., a Delaware corporation.

(d) "Company Affiliate" means any company which is either the parent corporation of the Company (as determined in accordance with Section 424 of the Code) or a Subsidiary.

(e) "Compensation" means the cash remuneration paid to a Participant during a Purchase Period that is reported on Form W-2 for federal income tax purposes (including salary deferrals to the Company's 401(k) retirement savings plan and contributions to any Code Section 125 plan adopted by the Company). Compensation shall include incentive compensation, commissions, profit sharing payments and bonuses. Notwithstanding the foregoing, Compensation shall exclude overtime and shift differential payments and any special payments (e.g., moving or auto allowances, educational reimbursements, welfare benefits, amounts realized from the exercise, sale exchange or other disposition of any stock option and premiums for life and disability insurance).

(f) "Date of Exercise" means the last trading day of each Purchase Period.

(g) "Eligible Employee" means any Employee of a Participating Company (i) who is customarily employed for at least twenty (20) hours per week, (ii) who is customarily employed for more than five (5) months per calendar year, and (iii) who is an Employee at the commencement of a Purchase Period.

In the event an Eligible Employee fails to remain in the continuous employ of a Participating Company customarily for at least twenty (20) hours per week during a Purchase Period, he or she will be deemed to have elected to withdraw from the Plan and the payroll deductions credited to his or her account will be returned to him or her; provided that a Participant who goes on an unpaid leave of absence shall be permitted to remain in the Plan during such leave of absence. Notwithstanding the preceding sentence, if such Participant is not guaranteed reemployment by contract or statute and the leave of absence extends beyond ninety (90) days, such Participant shall be deemed to have terminated employment for purposes of the Plan on the ninety-first (91st) day of such leave of absence. Payroll deductions for a Participant who has been on an unpaid leave of absence will resume at the same rate as in effect prior to such leave upon return to work unless changed by such Participant.

(h) "Employee" means any person who renders services to a Participating Company in the status of an employee within the meaning of Code Section 3401(c). "Employee" shall not include any Board member of a Participating Company who does not render services to the Participating Company in the status of an employee within the meaning of Code Section 3401(c).

(i) "Fair Market Value" shall mean, as of any given date, the value of a share of Stock determined as follows:

(A) If the Stock is listed on any established stock exchange (such as the New York Stock Exchange, the NASDAQ Global Market and the NASDAQ Global Select Market) or national market system, its Fair Market Value shall be the closing sales price for a share of Stock as quoted on such exchange or system for such date or, if there is no closing sales price for a share of Stock on the date in question, the closing sales price for a share of Stock on the last preceding date for which such quotation exists, as reported in The Wall Street Journal or such other source as the Plan Administrator deems reliable;

(B) If the Stock is not listed on an established stock exchange or national market system, but the Stock is regularly quoted by recognized securities dealer, its Fair Market Value shall be the mean of the high bid and low asked prices for such date or, if there are no high bid and low asked prices for a share of Stock on such date, the high bid and low asked prices for a share of Stock on the last preceding date for which such information exists, as reported in *The Wall Street Journal* or such other source as the Plan Administrator deems reliable; or

(C) If the Stock is neither listed on an established stock exchange or a national market system nor regularly quoted by a recognized securities dealer, its Fair Market Value shall be established by the Plan Administrator in good faith.

(j) "Participant" means an Eligible Employee who elects to participate in the Plan, as provided in Section 5 hereof.

(k) "Participating Company" means the Company and such present or future Subsidiaries of the Company as the Board of Directors shall from time to time designate.

(l) "Plan Account" means the account established for each Participant pursuant to Section 8(a).

(m) "Plan Administrator" means the committee appointed by the Board to administer the Plan pursuant to Section 4.

(n) "Purchase Period" shall mean the period commencing on May 15, 2020 and ending on August 14, 2020 and the six (6) month periods commencing on each August 15 and February 15 thereafter. The duration and timing of Purchase Periods may be changed by the Plan Administrator, in its sole discretion. In no event may a Purchase Period exceed twenty-seven (27) months in length.

(o) "Purchase Price" means the price at which Participants may purchase Stock under Section 8 of the Plan, as determined pursuant to Section 6.

(p) "Stock" means the common stock, par value $0.025, of the Company.

(q) "Stock Administrator" means the Company's Stock Administration Department or such other person(s) as may be retained by the Company to perform or otherwise be delegated some or all of the duties of the Stock Administrator under this Plan.

(r) "Subsidiary" means a subsidiary corporation as defined in Section 424(f) of the Code.

Section 3. Shares Authorized.

The maximum aggregate number of shares which may be issued under the Plan shall be 9,800,000 shares of Stock (subject to adjustment as provided in Section 12 hereof), which may be either authorized but unissued Stock or reacquired Stock, including shares of Stock purchased on the open market.

Section 4. Administration.

(a) Except as otherwise provided herein, the Plan shall be administered by the Board or by a committee (the "Plan Administrator") appointed by the Board of Directors which shall consist of not less than two members of the Board. References in this Plan to the "Plan Administrator" shall mean the Board if no Plan Administrator has been appointed. The interpretation and construction by the Plan Administrator of any provision of the Plan or of any right to purchase stock qualified hereunder shall be conclusive and binding on all persons.

(b) No member of the Board or the Plan Administrator shall be liable for any action or determination made in good faith with respect to the Plan or the right to purchase Stock hereunder. The Plan Administrator shall be indemnified by the Company against the reasonable expenses, including attorney's fees actually and necessarily incurred in connection with the defense of any action, suit or proceeding, or in connection with any appeal therein, to which it may be a party by reason of any action taken or failure to act under or in connection with the Plan or any stock purchased thereunder, and against all amounts paid by it in settlement thereof (provided such settlement is approved by independent legal counsel selected by the Company) or paid by it in satisfaction of a judgment in any such action, suit or proceeding, except in relation to matters as to which it shall be adjudged in such action, suit or proceeding that the Plan Administrator is liable for negligence or misconduct in the performance of its duties; provided that within sixty (60) days after institution of any such action, suit or proceeding, the Plan Administrator shall in writing offer the Company the opportunity, at its own expense, to handle and defend the same.

(c) All costs and expenses incurred in administering the Plan shall be paid by the Company. The Board or the Plan Administrator may request advice for assistance or employ such other persons as are necessary for proper administration of the Plan.

(d) At the discretion of the Plan Administrator, the Stock Administrator or such persons providing advice or assistance pursuant to Section 4(c), any elections, submission or filings made under the Plan by Eligible Employees and/or any statements or notices provided under the Plan to Eligible Employees in each case may be made electronically or through such "paperless" means as the Plan Administrator, the Stock Administrator or such persons may determine appropriate.

Section 5. Eligibility and Participation.

(a) Any person who qualifies or will qualify as an Eligible Employee on the first day of a Purchase Period may elect to participate in the Plan for such Purchase Period. An Eligible Employee may elect to participate by submitting the prescribed enrollment form. The enrollment form shall be filed with the Stock Administrator no later than the filing deadline imposed and communicated to Eligible Employees with respect to the Purchase Period for which such enrollment form is intended to be effective by the Stock Administrator, and if none is so imposed and/or communicated, then no later than five (5) days before the Purchase Period for which such enrollment form is intended to be effective. The Eligible Employee shall designate on the enrollment form the percentage of his or her Compensation which he or she elects to have withheld for the purchase of Stock, which may be any whole percentage from 1 to 15% of the Participant's compensation.

(b) By enrolling in the Plan, a Participant shall be deemed to have been granted an option on the first day of each Purchase Period for which he or she is enrolled to purchase the maximum number of whole shares of Stock which can be purchased with the amount of the Participant's Compensation which is withheld during the

Purchase Period for which the Participation is enrolled. However, with respect to any Purchase Period, no Participant shall be eligible to purchase more than two thousand (2,000) shares of Stock provided that such amount shall not result in the limitations set forth in Section 13 being exceeded. Notwithstanding the foregoing, the Plan Administrator, or a committee appointed by the Plan Administrator, which committee may be comprised solely of employees of the Company, shall have the right to amend the limit set forth in this Section 5(b); provided, however, that in no event shall the limit exceed two thousand (2,000) shares of Stock per Purchase Period or the limitations set forth in Section 13.

(c) Once enrolled, a Participant will continue to participate in the Plan for each succeeding Purchase Period until he or she terminates participation or ceases to qualify as an Eligible Employee. A Participant who withdraws from the Plan in accordance with Section 9 may again become a Participant in a subsequent Purchase Period, if he or she then is an Eligible Employee, by following the procedure described in Section 5(a).

Section 6. Purchase Price.

The Purchase Price for each share of Stock shall be the lesser of (a) eighty-five percent (85%) of the Fair Market Value of such share on the first trading day of an applicable Purchase Period or (b) eighty-five percent (85%) of the Fair Market Value of such share on the Date of Exercise for an applicable Purchase Period.

Section 7. Employee Contributions.

A Participant may purchase shares of Stock solely by means of payroll deductions. Payroll deductions, as designated by the Participant pursuant to Section 5(a), shall commence with the first paycheck issued during the Purchase Period and shall be deducted from each subsequent paycheck throughout the Purchase Period; provided, however, that, with respect to a Participant, the Company shall be entitled to discontinue payroll deductions for such Participant during a Purchase Period to the extent that the Company determines that the payroll deductions for such Participant during such Purchase Period will cause the Participant to exceed the limitations set forth in Sections 5 or 13; provided, further, that the Company will recommence payroll deductions for such Participant on the first day of the next Purchase Period to the extent the limitation set forth in Section 13 has not been exceeded. If a Participant desires to decrease the rate of payroll withholding during a Purchase Period, he or she may do so one time during a Purchase Period by submitting the prescribed percentage change form with the Stock Administrator. Such decrease will be effective no later than the first day of the second payroll period which begins following the receipt of the new percentage change form. If a Participant desires to increase or decrease the rate of payroll withholding, he or she may do so effective for the next Purchase Period by submitting a new percentage change form with the Stock Administrator on or before the date imposed and communicated to Eligible Employees by the Stock Administrator, and if none is so imposed and/or communicated, then no later than five (5) days before the Purchase Period for which such change is to be effective.

Section 8. Plan Accounts; Purchase of Shares.

(a) The Company will maintain a Plan Account on its books in the name of each Participant. At the close of each pay period, the amount deducted from the Participant's Compensation will be credited to the Participant's Plan Account.

(b) As of each Date of Exercise, the amount then in the Participant's Plan Account will be divided by the Purchase Price, and the number of whole shares which results (subject to the limitations described in Sections 5(b), 8(c) and 13) shall be purchased from the Company with the funds in the Participant's Plan Account. The number of shares of Stock so purchased shall be delivered to a brokerage account designated by the Plan Administrator and kept in such account pursuant to the enrollment form (which shall be uniform) between each

Participant and the Company and subject to the conditions described therein (which may include, without limitation, restrictions on transferability of the shares of Stock so purchased).

(c) In the event that the aggregate number of shares which all Participants elect to purchase during a Purchase Period shall exceed the number of shares remaining available for issuance under the Plan, then the number of shares to which each Participant shall become entitled shall be determined by multiplying the number of shares available for issuance by a fraction the numerator of which is the sum of the number of shares the Participant has elected to purchase pursuant to Section 5, and the denominator of which is the sum of the number of shares which all employees have elected to purchase pursuant to Section 5. Any cash amount remaining in the Participant's Plan Account under these circumstances shall be refunded to the Participant.

(d) Any amount remaining in the Participant's Plan Account caused by a surplus due to fractional shares after deducting the amount of the Purchase Price for the number of whole shares issued to the Participant shall be carried over in the Participant's Plan Account for the succeeding Purchase Period, without interest. Any amount remaining in the Participant's Plan Account caused by anything other than a surplus due to fractional shares shall be refunded to the Participant in cash, without interest.

(e) Unless otherwise determined by the Plan Administrator, as soon as practicable following the end of each Purchase Period, the Company shall deliver to each Participant a Plan Account statement setting forth the amount of payroll deductions, the Purchase Price, the number of shares purchased and the remaining cash balance, if any.

Section 9. Withdrawal from the Plan.

A Participant may elect to withdraw from participation under the Plan at any time up to seven (7) days prior to the last day of a Purchase Period by submitting the prescribed withdrawal form with the Stock Administrator. As soon as practicable after a withdrawal, payroll deductions shall cease and all amounts credited to the Participant's Plan Account will be refunded in cash, without interest. A Participant who has withdrawn from the Plan shall not be a Participant in future Purchase Periods, unless he or she again enrolls in accordance with the provisions of Section 5.

Section 10. Effect of Termination of Employment or Death.

(a) Termination of employment as an Eligible Employee for any reason, including death, shall be treated as an automatic withdrawal from the Plan under Section 9. A transfer from one Participating Company to another shall not be treated as a termination of employment.

(b) A Participant may file a written designation of a beneficiary who is to receive any shares and cash, if any, from the Participant's Account under the Plan in the event of such Participant's death subsequent to the purchase of shares but prior to delivery to him or her of such shares and cash. In addition, a Participant may file a written designation of a beneficiary who is to receive any cash from the Participant's Account under the Plan in the event of such Participant's death prior to the last day of a Purchase Period.

(c) Such designation of beneficiary may be changed by the Participant at any time by submitting the prescribed designation of beneficiary change form with the Stock Administrator. In the event of the death of a Participant in the absence of a valid designation of a beneficiary who is living at the time of such Participant's death, the Company shall deliver such shares and/or cash to the executor or administrator of the estate of the Participant; or if no such executor or administrator has been appointed (to the knowledge of the Company), the Company, in its discretion, may deliver such shares and/or cash to the spouse or to any one or more dependents or relatives of the Participant; or if no spouse, dependent or relative is known to the Company, then to such other person as the Company may designate.

Section 11. Rights Not Transferable.

The rights or interests of any Participant in the Plan, or in any Stock or moneys to which he or she may be entitled under the Plan, shall not be transferable by voluntary or involuntary assignment or by operation of law, or by any other manner other than as permitted by will or the laws of descent and distribution, and during the Participant's lifetime, purchase rights in the Plan shall be exercisable only by the Participant. If a Participant in any manner attempts to transfer, assign or otherwise encumber his or her rights or interest under the Plan, other than as permitted by will or the laws of descent and distribution, such act shall be treated as an automatic withdrawal under Section 9.

Section 12. Recapitalization, Etc.

(a) The aggregate number of shares of Stock offered under the Plan, the number and price of shares which any Participant has elected to purchase pursuant to Section 5 and the maximum number of shares which a Participant may elect to purchase under the Plan in any Purchase Period shall be proportionately adjusted for any increase or decrease in the number of issued shares of Stock resulting from a subdivision or consolidation of shares or any other capital adjustment, the payment of a stock dividend, or other increase or decrease in such shares affected without receipt of consideration by the Company.

(b) In the event of a dissolution or liquidation of the Company, this Plan shall terminate, and all amounts which each Participant has paid towards the Purchase Price of Stock hereunder shall be refunded, without interest.

(c) In the event of a sale of all or substantially all of the assets of the Company, an acquisition of the Company or the merger of the Company with or into another corporation, each outstanding Purchase Period shall be assumed or an equivalent Purchase Period substituted by the successor corporation or acquiror or a Parent or Subsidiary of the successor corporation or acquiror. In the event that the successor corporation or acquirer refuses to assume or substitute for the Purchase Period, the Purchase Period shall be shortened by setting a new Date of Exercise (the "New Exercise Date"). The New Exercise Date shall be before the date of the applicable transaction. The Company shall notify each Participant in writing at least five (5) days prior to the New Exercise Date, that the Date of Exercise for the Purchase Period has been changed to the New Exercise Date and that the purchase shall automatically occur on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Purchase Period pursuant to Section 9.

(d) The Plan shall in no event be construed to restrict in any way the Company's right to undertake a dissolution, liquidation, merger, consolidation, reorganization or other corporate transaction.

Section 13. Limitation on Stock Ownership.

Notwithstanding any provision herein to the contrary, no Participant shall be permitted to elect to participate in the Plan (i) if such Participant, immediately after his or her election to participate, would own stock possessing five percent (5%) or more of the total combined voting power or value of all classes of stock of the Company or any Company Affiliate, or (ii) if under the terms of the Plan the rights of the Employee to purchase Stock under this Plan and all other qualified employee stock purchase plans of the Company or its Company Affiliates would accrue at a rate which exceeds twenty-five thousand dollars ($25,000) of Fair Market Value of such Stock (determined at the time such right is granted) for each calendar year for which such right is outstanding at any time. For purposes of this Section, ownership of stock shall be determined by the attribution rules of Section 424(d) of the Code, and Participants shall be considered to own any stock which they have a right to purchase under this or any other stock plan.

Section 14. No Rights as an Employee.

Nothing in the Plan shall be construed to give any person the right to remain in the employ of a Participating Company. Each Participating Company reserves the right to terminate the employment of any person at any time and for any reason.

Section 15. Rights as a Stockholder.

A Participant shall have no rights as a stockholder with respect to any shares he or she may have a right to purchase under the Plan until the date of issuance to the brokerage account designated by the Plan Administrator the shares of Stock issued pursuant to the Plan.

Section 16. Use of Funds.

All payroll deductions received or held by the Company under the Plan may be used by the Company for any corporate purpose, and the Company shall not be obligated to segregate such payroll deductions in separate accounts.

Section 17. Amendment or Termination of the Plan.

Except as otherwise provided herein, the Board of Directors shall have the right to amend, modify or terminate the Plan at any time without notice. An amendment of the Plan shall be subject to stockholder approval only to the extent required by applicable laws, regulations or rules. The Plan shall terminate upon the earlier of (i) such date as is determined by the Company in its sole discretion or (ii) the date on which all shares available for issuance under the Plan shall have been sold pursuant to purchase rights exercised under the Plan.

Section 18. Governing Law.

The Plan shall be governed by, and construed and interpreted in accordance with, the laws of the State of Delaware.

Section 19. Stockholder Approval.

No purchase rights granted under the Plan shall be exercised, and no shares of Stock shall be issued hereunder, until such time as (i) the Plan shall have been approved by the stockholders of the Company; and (ii) the Company shall have complied with all applicable requirements of the Securities Act of 1933, as amended (including the registration of the shares of Stock issuable under the Plan on a Form S-8 registration statement filed with the Securities and Exchange Commission), all applicable listing requirements of any securities exchange on which the Stock is listed for trading and all other applicable requirements established by law or regulation. Such stockholder approval shall be prior to the earlier to occur of: (a) the first Date of Exercise of the Plan and (b) the twelve (12) month anniversary of the adoption of the Plan, provided, however, that such approval may not occur prior to twelve (12) months before the adoption of the Plan. In the event the Plan shall not have been approved by the stockholders of the Company prior to the first Date of Exercise of the Plan, the Plan shall terminate and all purchase rights granted under the Plan shall be canceled and become null and void.

Section 20. Equal Rights and Privileges.

All Eligible Employees of the Company (or of any Subsidiary) will have equal rights and privileges under this Plan so that this Plan qualifies as an "employee stock purchase plan" within the meaning of Section 423 of the Code or applicable Treasury regulations thereunder. Any provision of this Plan that is inconsistent with Section 423 and the Treasury regulations and other guidance promulgated thereunder will, without further act or amendment by the Company, the Board or the Plan Administrator, be reformed to comply with the equal rights and privileges requirement of Section 423 or such Treasury regulations or guidance.

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Exhibit 10.2

CALIX, INC.
AMENDED AND RESTATED 2017 NONQUALIFIED EMPLOYEE STOCK PURCHASE PLAN

ARTICLE I.
PURPOSE, SCOPE AND ADMINISTRATION OF THE PLAN

1.1. Purpose and Scope. The purpose of the Calix, Inc. Amended and Restated 2017 Nonqualified Employee Stock Purchase Plan (as amended from time to time, the "Plan") is to assist employees of Calix, Inc., a Delaware corporation (the "Company") and its Participating Subsidiaries in acquiring a stock ownership interest in the Company pursuant to a plan which is intended to help such employees provide for their future security and to encourage them to remain in the employment of the Company and its Subsidiaries. The Plan is not intended to qualify as an "employee stock purchase plan" under Section 423 of the Code. The Plan, which was approved by our stockholders in May 2020, amends and restates the Amended and Restated 2017 Nonqualified Employee Stock Purchase Plan approved by our stockholders in May 2018 (the "Prior Plan") in its entirety.

ARTICLE II.
DEFINITIONS

2.1 "Agent" means the brokerage firm, bank or other financial institution, entity or person(s), if any, engaged, retained, appointed or authorized to act as the agent of the Company or an Employee with regard to the Plan.

2.2 "Administrator" shall mean the Committee, or such individuals to which authority to administer the Plan has been delegated under Section 7.1 hereof.

2.3 "Affiliate" shall mean the Company and any Parent or Subsidiary.

2.4 "Code" shall mean the Internal Revenue Code of 1986, as amended.

2.5 "Committee" shall mean the Compensation Committee of the Board, or another committee or subcommittee of the Board or the Compensation Committee described in Article 7 hereof.

2.6 "Common Stock" shall mean common stock, par value $0.025, of the Company.

2.7 "Compensation" of an Employee shall mean the regular straight-time earnings, base salary, cash incentive compensation, cash bonuses (e.g., quarterly or annual bonuses or other corporate bonuses), one-time bonuses (e.g., retention or sign-on bonuses), taxable profit sharing payments, commissions, vacation pay, holiday pay, jury duty pay, funeral leave pay or military pay paid to the Employee from the Company or any Participating Subsidiary or any Affiliate on each Payday as compensation for services to the Company or any Participating Subsidiary or any Affiliate before deduction for any salary deferral contributions made by the Employee to any tax-qualified or nonqualified deferred compensation plan of the Company, any Participating Subsidiary or any Affiliate, but excluding overtime, shift differential payments, fringe benefits (including, without limitation, employer gifts), education or tuition reimbursements, imputed income arising under any Company, Participating Subsidiary or Affiliate group insurance or benefit program, travel expenses, business and moving reimbursements, income received in connection with any stock options, stock appreciation rights, restricted stock, restricted stock units or other compensatory equity awards and all contributions made by the Company, any Participating Subsidiary or any Affiliate for the Employee's benefit under any employee benefit plan now or hereafter established. Such Compensation shall be calculated before deduction of any income or employment tax withholdings, but shall be withheld from the Employee's net income.

2.8 "Effective Date" shall mean May 17, 2017.

2.9 "Eligible Employee" means an Employee of the Company or any Participating Subsidiary (i) who is customarily employed for at least twenty (20) hours per week and (ii) who is customarily employed for more than five (5) months per calendar year; but excluding (a) the Company's Chief Executive Officer, (b) each senior management Employee who reports directly to the Company's Chief Executive Officer, and (c) each other senior management Employee as identified in writing by the Administrator as being ineligible for the Plan.

2.10 "Employee" shall mean any person who renders services to the Company or a Participating Subsidiary in the status of an employee within the meaning of Section 3401(c) of the Code. "Employee" shall not include any director of the Company or a Participating Subsidiary who does not render services to the Company or a Participating Subsidiary in the status of an employee within the meaning of Section 3401(c) of the Code.

2.11 "Enrollment Date" shall mean the first date of each Offering Period.

2.12 "Exercise Date" shall mean the last trading day of each Offering Period, except as provided in Section 5.2 hereof.

2.13 "Exchange Act" shall mean the Securities Exchange Act of 1934, as amended.

2.14 "Fair Market Value" shall mean, as of any date, the value of a Share determined as follows:

(a) If the Common Stock is (i) listed on any established securities exchange (such as the New York Stock Exchange, the NASDAQ Global Market and the NASDAQ Global Select Market), (ii) listed on any national market system or (iii) listed, quoted or traded on any automated quotation system, its Fair Market Value shall be the closing sales price for a Share as quoted on such exchange or system for such date or, if there is no closing sales price for a Share on the date in question, the closing sales price for a Share on the last preceding date for which such quotation exists, as reported in *The Wall Street Journal* or such other source as the Administrator deems reliable;

(b) If the Common Stock is not listed on an established securities exchange, national market system or automated quotation system, but the Common Stock is regularly quoted by a recognized securities dealer, its Fair Market Value shall be the mean of the high bid and low asked prices for such date or, if there are no high bid and low asked prices for a Share on such date, the high bid and low asked prices for a Share on the last preceding date for which such information exists, as reported in *The Wall Street Journal* or such other source as the Administrator deems reliable; or

(c) If the Common Stock is neither listed on an established securities exchange, national market system or automated quotation system nor regularly quoted by a recognized securities dealer, its Fair Market Value shall be established by the Administrator in good faith.

2.15 "New Exercise Date" shall have such meaning as set forth in Section 5.2(b) hereof.

2.16 "Offering Period" shall mean, unless otherwise determined by the Administrator, the period commencing on June 21, 2020 and ending on November 14, 2020 and the six (6)-month periods commencing on each November 15 and ending on May 14, and May 15 and ending on November 14, thereafter.

2.17 "Option" shall mean the right to purchase Shares pursuant to the Plan during each Offering Period.

2.18 "Parent" shall mean any entity (other than the Company), whether domestic or foreign, in an unbroken chain of entities ending with the Company if each of the entities other than the Company beneficially owns, at the time of the determination, securities or interests representing more than fifty percent (50%) of the total combined voting power of all classes of securities or interests in one of the other entities in such chain.

2.19 "Participant" shall mean any Eligible Employee who elects to participate in the Plan.

2.20 "Participating Subsidiary" shall mean each Subsidiary that has been designated by the Board or Committee from time to time in its sole discretion as eligible to participate in the Plan in accordance with Section 7.2 hereof, in each case, including any Subsidiary in existence on the Effective Date and any Subsidiary formed or acquired following the Effective Date.

2.21 "Payday" shall mean the regular and recurring established day for payment of Compensation to an Employee of the Company or any Participating Subsidiary.

2.22 "Plan Account" shall mean a bookkeeping account established and maintained by the Company in the name of each Participant.

2.23 "Share" shall mean a share of Common Stock.

2.24 "Subsidiary" shall mean (a) a corporation, association or other business entity of which fifty percent (50%) or more of the total combined voting power of all classes of capital stock is owned, directly or indirectly, by the Company and/or by one or more Subsidiaries, (b) any partnership or limited liability company of which fifty percent (50%) or more of the equity interests are owned, directly or indirectly, by the Company and/or by one or more Subsidiaries, and (c) any other entity not described in clauses (a) or (b) above of which fifty percent (50%) or more of the ownership and the power (whether voting interests or otherwise), pursuant to a written contract or agreement, to direct the policies and management or the financial and the other affairs thereof, are owned or controlled by the Company and/or by one or more Subsidiaries.

2.25 "Withdrawal Election" shall have such meaning as set forth in Section 6.1(a) hereof.

ARTICLE III.
PARTICIPATION

3.1 Eligibility. Any Eligible Employee who shall be employed by the Company or a Participating Subsidiary on a given Enrollment Date for an Offering Period shall be eligible to participate in the Plan during such Offering Period, subject to the requirements of Articles IV and V hereof.

3.2 Election to Participate; Payroll Deductions

(a) Except as provided in Section 3.3 hereof, an Eligible Employee may become a Participant in the Plan only by means of payroll deduction. Each individual who is an Eligible Employee as of the Enrollment Date of the applicable Offering Period may elect to participate in such Offering Period and the Plan by delivering to the Company an enrollment form for the Plan designating payroll deduction authorization by such date specified by the Company.

(b) Payroll deductions with respect to an Offering Period (i) shall be equal to at least one percent (1%) of the Participant's Compensation as of each Payday during the applicable Offering Period, but not more than twenty-five percent (25%) of the Participant's Compensation as of each Payday during the applicable Offering Period and (ii) may be expressed either as (A) a whole number percentage or (B) a fixed dollar amount (as determined by the Administrator). Amounts deducted from a Participant's Compensation with respect to an Offering Period pursuant to this Section 3.2 shall be deducted each Payday through payroll deduction and credited to the Participant's Plan Account.

(c) Following at least one (1) payroll deduction, a Participant may decrease (to as low as 0%) the amount deducted from such Participant's Compensation only once during an Offering Period upon ten (10) calendar days' prior written or electronic notice to the Company. A Participant may not increase the amount deducted from such Participant's Compensation during an Offering Period.

(d) Notwithstanding the foregoing, upon the completion of an Offering Period, each Participant in such Offering Period shall automatically participate in the Offering Period that commences immediately following the completion of such Offering Period at the same payroll deduction percentage or fixed amount as in effect at the completion of the prior Offering Period, unless such Participant delivers to the Company a different election with respect to the successive Offering Period in accordance with Section 3.1 hereof, or unless such Participant becomes ineligible for participation in the Plan.

3.3 Leave of Absence. During leaves of absence approved by the Company meeting the requirements of Treasury Regulation Section 1.421-1(h)(2) under the Code, an individual shall be treated as an Employee of the Company or Participating Subsidiary that employs such individual immediately prior to such leave.

ARTICLE IV.
PURCHASE OF SHARES

4.1 Grant of Option; Automatic Exercise. Each Participant shall be granted an Option with respect to an Offering Period on the applicable Exercise Date. On the Exercise Date for such Offering Period, the Option will be automatically exercised to (a) purchase that number of Shares calculated by dividing (i) such Participant's payroll deductions accumulated on or prior to such Exercise Date and retained in the Participant's Plan Account on such Exercise Date by (ii) the Fair Market Value of a Share on such Exercise Date (the "Purchased Shares") and (b) acquire a number of Shares equal to the Purchased Shares that are subject to a risk of forfeiture (the "Restricted Shares"). The balance, if any, remaining in the Participant's Plan Account (after exercise of such Participant's Option) as of such Exercise Date shall be carried forward to the next Offering Period, unless the Participant has elected to withdraw from the Plan pursuant to Section 6.1 hereof or, pursuant to Section 6.2 hereof, such Participant has ceased to be an Eligible Employee.

4.2 Restricted Shares. The risk of forfeiture on the Restricted Shares shall automatically lapse on the first anniversary of the Exercise Date, subject to the Participant continuing to be an Employee through such date.

4.3 Share Issuance. As soon as practicable following the applicable Exercise Date (but in no event more than thirty (30) days thereafter), the Purchased Shares and Restricted Shares shall be delivered (either in share certificate or book entry form), in the Company's sole discretion, to either (i) the Participant or (ii) an account established in the Participant's name at a stock brokerage or other financial services firm designated by the Company. If the Company is required to obtain from any commission or agency authority to issue any such Shares, the Company shall seek to obtain such authority. Inability of the Company to obtain from any such commission or agency authority which counsel for the Company deems necessary for the lawful issuance of any such shares shall relieve the Company from liability to any Participant except to refund to the Participant such Participant's Plan Account balance, without interest thereon.

4.4 Transferability.

(a) An Option granted under the Plan shall not be transferable, other than by will or the applicable laws of descent and distribution, and shall be exercisable during the Participant's lifetime only by the Participant. No Option or interest or right to the Option shall be available to pay off any debts, contracts or engagements of the Participant or his or her successors in interest or shall be subject to disposition by pledge, encumbrance, assignment or any other means whether such disposition be voluntary or involuntary or by operation of law by judgment, levy, attachment, garnishment or any other legal or equitable proceedings (including bankruptcy), and any attempt at disposition of the Option shall have no effect.

(b) Unless otherwise determined by the Administrator, no Shares issued upon exercise of an Option under the Plan may be assigned, transferred, pledged or otherwise disposed of in any way by the Participant until the first anniversary of the Exercise Date upon which such Shares were purchased. Unless otherwise determined by the Administrator, in the event a Participant ceases to be an Employee prior to the first anniversary of the Exercise Date upon which Shares were purchased, the Restricted Shares acquired on such Exercise Date shall be forfeited for no consideration, and the transfer restrictions applicable to the Purchased Shares purchased on such Exercise Date shall immediately lapse.

4.5 Limitations on the Purchase of Shares. Notwithstanding any provision in the Plan to the contrary, no more than an aggregate of five hundred thousand (500,000) Shares (the "Offering Period Share Limit") shall be purchased by one or more Participants on any Exercise Date. Prior to the commencement of an Offering Period, the Administrator may provide for a limit on individual contributions or a maximum number of Shares a Participant may acquire in such Offering Period and any such limit or maximum shall be deemed to constitute an Offering Period Share Limit hereunder. In the event the Company determines that, on a given Exercise Date, the number of Shares with respect to which Options are to be exercised may exceed the Offering Period Share Limit, the Administrator shall make a pro rata allocation of the Shares available for issuance on such Exercise Date in as uniform a manner as shall be practicable and as it shall determine in its sole discretion to be equitable among all Participants exercising Options to purchase Shares on such Exercise Date. For the avoidance of doubt, any such pro rata allocation shall be applied to an equal extent between Purchased Shares and Restricted Shares.

ARTICLE V.
PROVISIONS RELATING TO COMMON STOCK

5.1 Common Stock Reserved. Subject to adjustment as provided in Section 5.2 hereof, the maximum number of Shares that shall be made available for sale under the Plan shall be four million seven hundred thousand (4,700,000) Shares. Shares made available for sale under the Plan may be authorized but unissued shares or reacquired shares reserved for issuance under the Plan.

5.2 Adjustments Upon Changes in Capitalization, Dissolution, Liquidation, Merger or Asset Sale.

(a) Changes in Capitalization. Subject to any required action by the stockholders of the Company, the number of Shares which have been authorized for issuance under the Plan but not yet placed under an Option, as well as the price per share and the number of Shares covered by each Option under the Plan which has not yet been exercised shall be proportionately adjusted for any increase or decrease in the number of issued Shares resulting from a stock split, reverse stock split, stock dividend, combination or reclassification of the Common Stock or any other increase or decrease in the number of Shares effected without receipt of consideration by the Company; provided, however, that conversion of any convertible securities of the Company shall not be deemed to have been "effected without receipt of consideration." Such adjustment shall be made by the Administrator, whose determination in that respect shall be final, binding and conclusive. Except as expressly provided herein, no issuance by the Company of shares of stock of any class, or securities convertible into shares of stock of any class, shall affect, and no adjustment by reason thereof shall be made with respect to, the number or price of Shares subject to an Option.

(b) Dissolution or Liquidation. In the event of the proposed dissolution or liquidation of the Company, the Offering Period then in progress shall be shortened by setting a new Exercise Date (the "New Exercise Date"), and such Offering Period shall terminate immediately prior to the consummation of such proposed dissolution or liquidation, unless provided otherwise by the Administrator. The New Exercise Date shall be before the date of the Company's proposed dissolution or liquidation. The Administrator shall notify each Participant in writing, at least ten (10) business days prior to the New Exercise Date, that the next Exercise Date for the Participant's Option has been changed to the New Exercise Date and that the Participant's Option shall be exercised automatically on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Offering Period as provided in Section 6.1(a)(i) hereof or the Participant has ceased to be an Eligible Employee as provided in Section 6.2 hereof.

(c) Merger or Asset Sale. In the event of a proposed sale of all or substantially all of the assets of the Company, or the merger of the Company with or into another corporation, each outstanding Option shall be assumed or an equivalent Option substituted by the successor corporation or a Parent or Subsidiary of the successor corporation. In the event that the Option is not assumed or substituted, any Offering Periods then in progress shall be shortened by setting a New Exercise Date and any Offering Periods then in progress shall end on the New Exercise Date. The New Exercise Date shall be before the date of the Company's proposed sale or merger. The Administrator shall notify each Participant in writing, at least ten (10) business days prior to the New Exercise Date, that the next Exercise Date for the Participant's Option has been changed to the New Exercise Date and that the Participant's Option shall be exercised automatically on the New Exercise Date, unless prior to such date the Participant has withdrawn from the Offering Periods as provided in Section 6.1(a)(i) hereof or the Participant has ceased to be an Eligible Employee as provided in Section 6.2 hereof.

5.3 Insufficient Shares. If the Administrator determines that, on a given Exercise Date, the number of Shares with respect to which Options are to be exercised may exceed the number of Shares remaining available for sale under the Plan on such Exercise Date, the Administrator shall make a pro rata allocation of the Shares available for issuance on such Exercise Date in as uniform a manner as shall be practicable and as it shall determine in its sole discretion to be equitable among all Participants exercising Options to purchase Shares on such Exercise Date, and unless additional shares are authorized for issuance under the Plan, no further Offering Periods shall take place and the Plan shall terminate pursuant to Section 7.5 hereof. If an Offering Period is so terminated, then the balance of the amount credited to the Participant's Plan Account which has not been applied to the purchase of Shares shall be paid to such Participant in one (1) lump sum in cash within thirty (30) days after such Exercise Date, without any interest thereon.

5.4 Rights as Stockholders. With respect to Shares subject to an Option, a Participant shall not be deemed to be a stockholder of the Company and shall not have any of the rights or privileges of a stockholder. A Participant shall have the rights and privileges of a stockholder of the Company when, but not until, Shares have been deposited in the designated brokerage account following exercise of his or her Option. Notwithstanding the foregoing, in the event a dividend is paid in respect of Restricted Shares, such dividend shall not be paid to the Participant holding such Restricted Shares unless and until the risk of forfeiture thereon lapses.

ARTICLE VI.
TERMINATION OF PARTICIPATION

6.1 Cessation of Contributions; Voluntary Withdrawal.

(a) A Participant may cease payroll deductions during an Offering Period and elect to withdraw from the Plan by delivering written or electronic notice of such election (a "Withdrawal Election") to the Company in such form and at such time prior to the Exercise Date for such Offering Period as may be established by the Administrator. A Participant electing to withdraw from the Plan may elect to either (i) withdraw all of the funds then credited to the Participant's Plan Account as of the date on which the Withdrawal Election is received by the Company, in which case amounts credited to such Plan Account shall be returned to the Participant in one (1) lump-sum payment in cash within thirty (30) days after such election is received by the Company, without any interest thereon, and the Participant shall cease to participate in the Plan and the Participant's Option for such Offering Period shall terminate; or (ii) subject to Section 6.2 below, exercise the Option for the maximum number of whole Shares on the applicable Exercise Date with any remaining Plan Account balance returned to the Participant in one (1) lump-sum payment in cash within thirty (30) days after such Exercise Date, without any interest thereon, and after such exercise cease to participate in the Plan. As soon as practicable following the Company's receipt of a Withdrawal Election, the Participant's payroll deduction authorization and his or her Option to purchase Shares under the Plan shall terminate.

(b) A Participant's withdrawal from the Plan shall not have any effect upon his or her eligibility to participate in any similar plan which may hereafter be adopted by the Company or in succeeding Offering Periods which commence after the termination of the Offering Period from which the Participant withdraws.

(c) A Participant who ceases contributions to the Plan during any Offering Period shall not be permitted to resume contributions to the Plan during such Offering Period.

6.2 Termination of Eligibility. Upon a Participant's ceasing to be an Eligible Employee for any reason, such Participant's Option for the applicable Offering Period shall automatically terminate, he or she shall be deemed to have elected to withdraw from the Plan, and such Participant's Plan Account shall be paid to such Participant or, in the case of his or her death, to the person or persons entitled thereto as set forth in an applicable beneficiary designation form (or, if there is no such applicable form, pursuant to applicable law), within thirty (30) days after such cessation of being an Eligible Employee, without any interest thereon.

ARTICLE VII.
GENERAL PROVISIONS

7.1 Administration.

(a) The Plan shall be administered by the Committee (or another committee or a subcommittee of the Board assuming the functions of the Committee under the Plan), which, unless otherwise determined by the Board, shall consist solely of two or more members of the Board, each of whom is intended to qualify as a "non-employee director" as defined by Rule 16b-3 of the Exchange Act and an "independent director" under the rules of any securities exchange or automated quotation system on which the Shares are listed, quoted or traded, in each case, to the extent required under such provision. The Committee may delegate administrative tasks under the Plan to the services of an Agent and/or Employees to assist in the administration of the Plan, including establishing and maintaining an individual securities account under the Plan for each Participant.

(b) It shall be the duty of the Administrator to conduct the general administration of the Plan in accordance with the provisions of the Plan. The Administrator shall have the power, subject to, and within the limitations of, the express provisions of the Plan:

i. To establish and terminate Offering Periods;

ii. To determine when and how Options shall be granted and the provisions and terms of each Offering Period (which need not be identical);

iii. To select Participating Subsidiaries in accordance with Section 7.2 hereof; and

iv. To construe and interpret the Plan, the terms of any Offering Period and the terms of the Options and to adopt such rules for the administration, interpretation, and application of the Plan as are consistent therewith and to interpret, amend or revoke any such rules. The Administrator, in the exercise of this power, may correct any defect, omission or inconsistency in the Plan, any Offering Period or any Option, in a manner and to the extent it shall deem necessary or expedient to make the Plan fully effective.

(c) The Administrator may adopt rules or procedures relating to the operation and administration of the Plan to accommodate the specific requirements of local laws and procedures. Without limiting the generality of the foregoing, the Administrator is specifically authorized to adopt rules and procedures regarding handling of participation elections, payroll deductions, payment of interest, conversion of local currency, payroll tax, withholding procedures and handling of stock certificates which vary with local requirements. In its absolute discretion, the Board may at any time and from time to time exercise any and all rights and duties of the Administrator under the Plan.

(d) The Administrator may adopt sub-plans applicable to particular Participating Subsidiaries or locations. The rules of such sub-plans may take precedence over other provisions of this Plan, with the exception of Section 5.1 hereof, but unless otherwise superseded by the terms of such sub-plan, the provisions of this Plan shall govern the operation of such sub-plan.

(e) All expenses and liabilities incurred by the Administrator in connection with the administration of the Plan shall be borne by the Company. The Administrator may, with the approval of the Committee, employ attorneys, consultants, accountants, appraisers, brokers or other persons. The Administrator, the Company and its officers and directors shall be entitled to rely upon the advice, opinions or valuations of any such persons. All actions taken and all interpretations and determinations made by the Administrator in good faith shall be final and binding upon all Participants, the Company and all other interested persons. No member of the Board or Administrator shall be personally liable for any action, determination or interpretation made in good faith with respect to the Plan or the options, and all members of the Board or Administrator shall be fully protected by the Company in respect to any such action, determination or interpretation.

7.2 Designation of Participating Subsidiaries. The Board or Committee shall designate from among the Subsidiaries, as determined from time to time, the Subsidiary or Subsidiaries that shall constitute Participating Subsidiaries. The Board or Committee may designate a Subsidiary, or terminate the designation of a Subsidiary, without the approval of the stockholders of the Company.

7.3 Accounts. Individual accounts shall be maintained for each Participant in the Plan.

7.4 No Right to Employment. Nothing in the Plan shall be construed to give any person (including any Participant) the right to remain in the employ of the Company, a Parent or a Subsidiary or to affect the right of the Company, any Parent or any Subsidiary to terminate the employment of any person (including any Participant) at any time, with or without cause, which right is expressly reserved.

7.5 Amendment, Suspension and Termination of the Plan

(a) The Board may, in its sole discretion, amend, suspend or terminate the Plan at any time and from time to time; provided, however, that without approval of the Company's stockholders given within twelve (12) months before or after action by the Board, the Plan may not be amended to increase the maximum number of Shares subject to the Plan or in any other manner that requires the approval of the Company's stockholders under applicable law or applicable stock exchange rules or regulations. No Option may be granted during any period of suspension of the Plan or after termination of the Plan. For the avoidance of doubt, without the approval of the Company's stockholders and without regard to whether any Participant rights may be considered to have been "adversely affected," the Board or the Committee, as applicable, shall be entitled to change the terms of an Offering Period, limit the frequency and/or number of changes in the amount withheld during an Offering Period, permit payroll withholding in excess of the amount designated by a Participant in order to adjust for delays or mistakes in the Company's processing of properly completed withholding elections, establish reasonable waiting and adjustment periods and/or accounting and crediting procedures to ensure that amounts applied toward the purchase of Shares for each Participant properly correspond with amounts withheld from the Participant's Compensation, and establish such other limitations or procedures as the Board or the Committee, as applicable, determines in its sole discretion advisable which are consistent with the Plan.

(b) In the event the Administrator determines that the ongoing operation of the Plan may result in unfavorable financial accounting consequences, the Administrator may, in its discretion and, to the extent necessary or desirable, modify or amend the Plan to reduce or eliminate such accounting consequence including, but not limited to:

i. shortening any Offering Period so that the Offering Period ends on a new Exercise Date, including an Offering Period underway at the time of the Administrator action; and

ii. allocating Shares.

Such modifications or amendments shall not require stockholder approval or the consent of any Participant.

(c) Upon termination of the Plan, the balance in each Participant's Plan Account shall be refunded as soon as practicable after such termination, without any interest thereon.

7.6 Use of Funds; No Interest Paid. All funds received by the Company by reason of purchase of Shares under the Plan shall be included in the general funds of the Company free of any trust or other restriction and may be used for any corporate purpose. No interest shall be paid to any Participant or credited under the Plan.

7.7 Effect Upon Other Plans. The adoption of the Plan shall not affect any other compensation or incentive plans in effect for the Company, any Parent or any Subsidiary. Nothing in the Plan shall be construed to limit the right of the Company, any Parent or any Subsidiary (a) to establish any other forms of incentives or compensation for Employees of the Company or any Parent or any Subsidiary or (b) to grant or assume Options otherwise than under the Plan in connection with any proper corporate purpose, including, but not by way of limitation, the grant or assumption of options in connection with the acquisition, by purchase, lease, merger, consolidation or otherwise, of the business, stock or assets of any corporation, firm or association.

7.8 Conformity to Securities Laws. Notwithstanding any other provision of the Plan, the Plan and the participation in the Plan by any individual who is then subject to Section 16 of the Exchange Act shall be subject to any additional limitations set forth in any applicable exemption rule under Section 16 of the Exchange Act (including any amendment to Rule 16b-3 of the Exchange Act) that are requirements for the application of such exemptive rule. To the extent permitted by applicable law, the Plan shall be deemed amended to the extent necessary to conform to such applicable exemptive rule.

7.9 Data Privacy. As a condition of participating in the Plan, each Participant explicitly and unambiguously consents to the collection, use and transfer, in electronic or other form, of personal data as described in this Section 7.9 by and among, as applicable, the Company and its Subsidiaries for the exclusive purpose of implementing, administering and managing the Participant's participation in the Plan. The Company and its Subsidiaries may hold certain personal information about a Participant, including but not limited to, the Participant's name, home address and telephone number, date of birth, social security or insurance number or other identification number, salary, nationality, job title(s), any shares of stock held in the Company or any of its Subsidiaries, details of all Purchased Shares, Restricted Shares and Options, in each case, for the purpose of implementing, managing and administering the Plan and Awards (the "Data"). The Company and its Subsidiaries may transfer the Data amongst themselves as necessary for the purpose of implementation, administration and management of a Participant's participation in the Plan, and the Company and its Subsidiaries may each further transfer the Data to any third parties assisting the Company and its Subsidiaries in the implementation, administration and management of the Plan. These recipients may be located in the Participant's country, or elsewhere, and the Participant's country may have different data privacy laws and protections than the recipients' country. Through participating in the Plan, each Participant authorizes such recipients to receive, possess, use, retain and transfer the Data, in electronic or other form, for the purposes of implementing, administering and managing the Participant's participation in the Plan, including any requisite transfer of such Data as may be required to a broker or other third party with whom the Company or any of its Subsidiaries or the Participant may elect to deposit any Shares. The Data related to a Participant will be held only as long as is necessary to implement, administer, and manage the Participant's participation in the Plan. A Participant may, at any time, view the Data held by the Company with respect to such Participant, request additional information about the storage and processing of the Data with respect to such Participant, recommend any necessary corrections to the Data with respect to the Participant or refuse or withdraw the consents herein in writing, in any case without cost, by contacting his or her local human resources representative. The Company may cancel Participant's ability to participate in the Plan and, in the Administrator's discretion, the Participant may forfeit any Restricted Shares for which the risk of forfeiture has not lapsed if the Participant refuses or withdraws his or her consents as described herein. For more information on the consequences of refusal to consent or withdrawal of consent, Participants may contact their local human resources representative.

7.10 Tax Withholding. The Company or any Participating Subsidiary shall have the authority and the right to deduct or withhold, or require a Participant to remit to the Company, an amount sufficient to satisfy federal, state, local and foreign taxes (including the Participant's FICA or employment tax obligation) required by law to be withheld with respect to any taxable event concerning a Participant arising as a result of the Plan. The Administrator may in its sole discretion and in satisfaction of the foregoing requirement withhold or have surrendered, or allow a Participant to elect to have the Company withhold or surrender, Restricted Shares for which the risk of forfeiture has lapsed. Unless determined otherwise by the Administrator, the number of Shares which may be so withheld or surrendered shall be limited to the number of shares which have a Fair Market Value on the date of withholding or surrender no greater than the aggregate amount of such liabilities based on the maximum statutory withholding rates for federal, state, local and foreign income tax and payroll tax purposes that are applicable to such supplemental taxable income. The Administrator shall also have the authority and right to initiate, or permit a Participant to initiate, a broker- assisted sell-to-cover transaction whereby Shares are sold by such broker and the proceeds of such sale are remitted to the Company to satisfy tax withholding obligations.

7.11 Governing Law. The Plan and all rights and obligations thereunder shall be construed and enforced in accordance with the laws of the State of Delaware.

7.12 Notices. All notices or other communications by a Participant to the Company under or in connection with the Plan shall be deemed to have been duly given when received in the form specified by the Company at the location, or by the person, designated by the Company for the receipt thereof (including without limitation the Company's stock plan administrator).

7.13 Conditions to Issuance of Shares.

(a) Notwithstanding anything herein to the contrary, the Company shall not be required to issue or deliver any certificates or make any book entries evidencing Shares pursuant to the exercise of an Option by a Participant, unless and until the Board or the Committee has determined, with advice of counsel, that the issuance of such Shares is in compliance with all applicable laws, regulations of governmental authorities and, if applicable, the requirements of any securities exchange or automated quotation system on which the Shares are listed or traded, and the Shares are covered by an effective registration statement or applicable exemption from registration. In addition to the terms and conditions provided herein, the Board or the Committee may require that a Participant make such reasonable covenants, agreements, and representations as the Board or the Committee, in its discretion, deems advisable in order to comply with any such laws, regulations or requirements.

(b) All certificates for Shares delivered pursuant to the Plan and all Shares issued pursuant to book entry procedures are subject to any stop-transfer orders and other restrictions as the Committee deems necessary or advisable to comply with federal, state or foreign securities or other laws, rules and regulations and the rules of any securities exchange or automated quotation system on which the Shares are listed, quoted or traded. The Committee may place legends on any certificate or book entry evidencing Shares to reference restrictions applicable to the Shares.

(c) The Committee shall have the right to require any Participant to comply with any timing or other restrictions with respect to the settlement, distribution or exercise of any Option, including a window-period limitation, as may be imposed in the sole discretion of the Committee.

(d) Notwithstanding any other provision of the Plan, unless otherwise determined by the Committee or required by any applicable law, rule or regulation, the Company may, in lieu of delivering to any Participant certificates evidencing Shares issued in connection with any Option, record the issuance of Shares in the books of the Company (or, as applicable, its transfer agent or stock plan administrator).

7.14 Section 409A. Neither the Plan nor any Option granted hereunder is intended to constitute or provide for "nonqualified deferred compensation" within the meaning of Section 409A of the Code and the Department of Treasury regulations and other interpretive guidance issued thereunder, including without limitation any such regulations or other guidance issued after the Effective Date (together, "Section 409A"). Notwithstanding any provision of the Plan to the contrary, if the Administrator determines that any Option may be or become subject to Section 409A of the Code, the Administrator may adopt such amendments to the Plan and/or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions as the Administrator determines are necessary or appropriate to avoid the imposition of taxes under Section 409A of the Code, either through compliance with the requirements of Section 409A of the Code or with an available exemption therefrom.

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Exhibit 31.1

CERTIFICATION OF CHIEF EXECUTIVE OFFICER
PURSUANT TO SECTION 302 OF
THE SARBANES-OXLEY ACT OF 2002

I, Carl Russo, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Calix, Inc. for the quarter ended June 27, 2020;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: July 21, 2020

/s/ Carl Russo

Carl Russo
Chief Executive Officer

Exhibit 31.2

CERTIFICATION OF CHIEF FINANCIAL OFFICER
PURSUANT TO SECTION 302 OF
THE SARBANES-OXLEY ACT OF 2002

I, Cory Sindelar, certify that:

1. I have reviewed this quarterly report on Form 10-Q of Calix, Inc. for the quarter ended June 27, 2020;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: July 21, 2020

/s/ Cory Sindelar

Cory Sindelar
Chief Financial Officer

Exhibit 32.1

**CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER
PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

I, Carl Russo, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Quarterly Report of Calix, Inc. (the "Company") on Form 10-Q for the fiscal quarter ended June 27, 2020 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Quarterly Report on Form 10-Q fairly presents in all material respects the financial condition and results of operations of the Company.

Date: July 21, 2020	/s/ Carl Russo
	Carl Russo
	Chief Executive Officer

I, Cory Sindelar, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Quarterly Report of Calix, Inc. (the "Company") on Form 10-Q for the fiscal quarter ended June 27, 2020 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Quarterly Report on Form 10-Q fairly presents in all material respects the financial condition and results of operations of the Company.

Date: July 21, 2020	/s/ Cory Sindelar
	Cory Sindelar
	Chief Financial Officer

This certification accompanies the Form 10-Q to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Calix, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-Q), irrespective of any general incorporation language contained in such filing.